FACT SHEET FOR NPDES PERMIT WA-002951-3
FACILITY NAME: CITY OF DUVALL

SUMMARY

This fact sheet is a companion document to the draft National Pollutant Discharge Elimination System (NPDES) permit for City of Duvall's Wastewater Treatment Plant (WWTP). The fact sheet explains the nature of the proposed discharges, the Department of Ecology's (the Department's) decisions on limiting the pollutants in the waste water, and the regulatory and technical basis for those decisions. The fact sheet and draft permit are available for review (see Appendix A—Public Involvement for more detail on the public notice procedures).

TABLE OF CONTENTS

INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the state of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty (30) days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A—Public Involvement of the fact sheet for more detail on the public notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D—Response to Comments.

GENERAL INFORMATION	
Applicant	City of Duvall, Wastewater Treatment Plant P.O. Box 1300 Duvall, WA 98019
Facility Name and Address	City of Duvall, Wastewater Treatment Plant 14525 Main Street NE Duvall, WA 98019
Type of Treatment	Membrane Bioreactor
Discharge Location	Waterbody: Snoqualmie River Latitude: 47.735° N Longitude: 121.989° W
	1218442475506 Snoqualmie River

The City of Duvall is located approximately 25 miles northeast of Seattle. The wastewater treatment plant is located approximately 2/10th of a mile from the Snoqualmie River and the outfall discharges into the Snoqualmie River at approximately river mile 10.4.

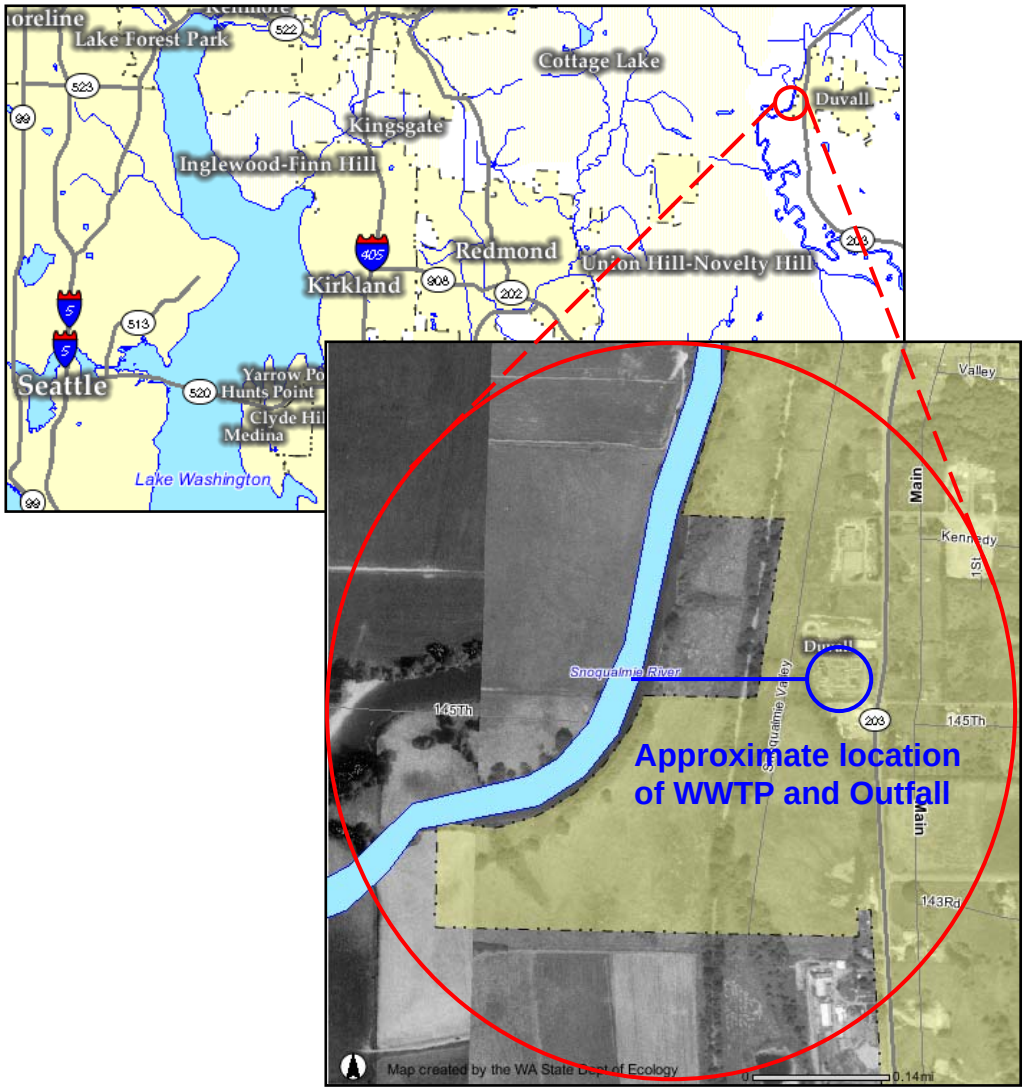


FIGURE 1: VICINITY MAP AND AERIAL MAP

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

HISTORY

The original facility was constructed in 1976 when sewers were installed in the City and the oxidation ditch WWTP plant was built. In 1992 the original 0.2 MGD plant was upgraded to treat 0.9 MGD with the addition of another oxidation ditch, two new clarifiers, a new chlorination basin, and ancillary equipment. In 1995 the chlorination system was replaced with a medium pressure ultraviolet (UV) disinfection system. The most recent upgrade was completed with the start up of a new membrane bioreactor

(MBR) plant on May 17, 2005. This was a major upgrade which included new headworks equipment, a conversion of the oxidation ditch to serve as an anoxic/equalization basin upstream of the MBRs, the conversion of the two clarifiers to aerobic digesters, and a new belt filter.

COLLECTION SYSTEM STATUS

The original collection system dates back to 1976. The system collects primarily residential sewage from a population estimated at 5,600 people (2005). The City has approximately 100,000 lineal feet of existing sanitary sewer main. The conveyance system includes eight pump stations.

The City continues to address infiltration and inflows (I/I) through ongoing inspection and rehabilitation program. Annual I/I inspection reports were submitted as required by the previous permit.

TREATMENT PROCESSES

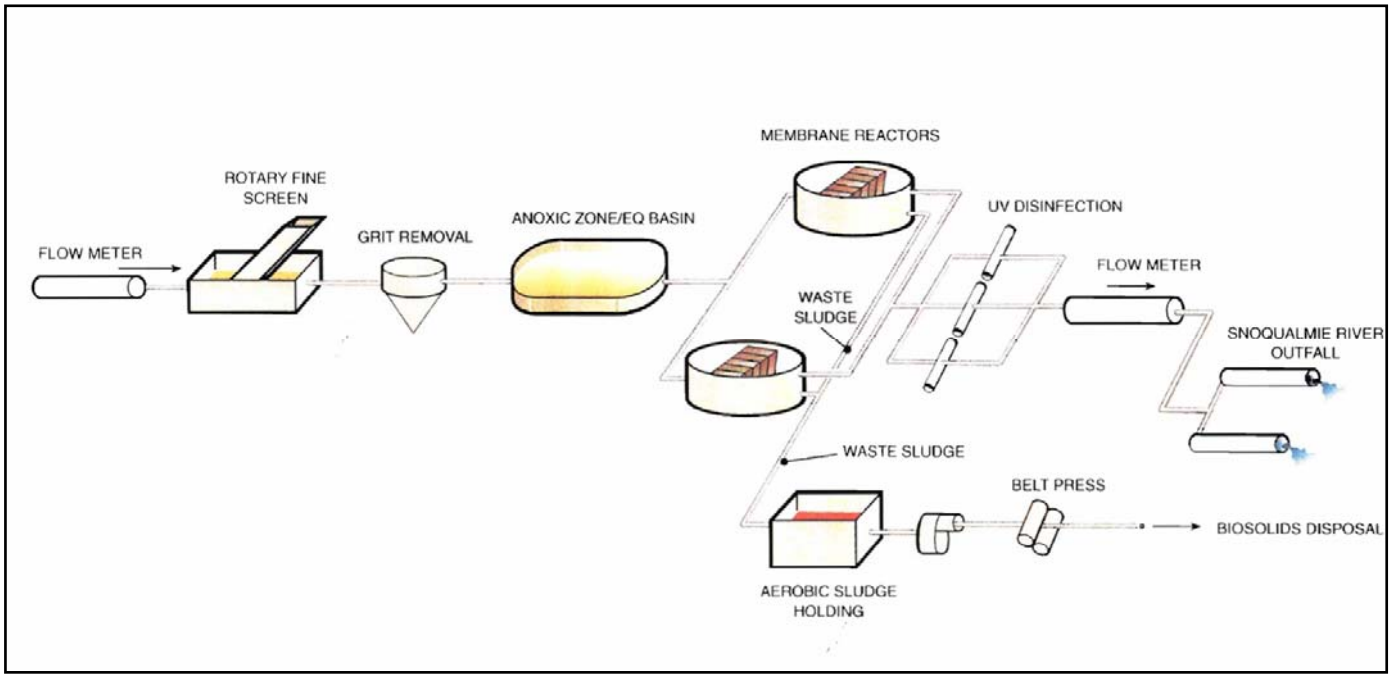


FIGURE 2: PROCESS FLOW DIAGRAM

Influent and Headworks

The influent flow is measured through a Parshall flume using an ultrasonic flow meter. The influent flow is measured after screening. The headworks include a 3 mm Parkson Hycor screen, and a 2 mm Jones and Attwood band screen and grit removal. The screenings and grit are conveyed by auger into a storage bin for disposal at a landfill.

Secondary Treatment

The biological part of the treatment process includes the Anoxic Tank, Equalization and Aeration Tanks, and the Membrane Bioreactors (MBRs). The influent flows by gravity through the headworks and then flows into the two Anoxic tanks. The waste water is then pumped to the aeration tanks which are equipped with fine-bubble diffusers. From the aeration tanks, the waste

water flows into the three membrane tanks that contain the membrane bio-reactor cartridges. Permeate is a name given to the cleaned wastewater that is pulled through the membrane by vacuum created by the Permeate pumps. The Permeate is then disinfected using ultraviolet light and flows through the outfall for discharge to the Snoqualmie River.

Air serves two purposes in the MBR process. First, it is added to the aeration tanks through fine-bubble diffusers to support the biological activity in the tank. Second, air is introduced into the MBR tank through course-bubble diffusers in order to scour solids from the membrane surface and provide oxygen for the micro-organisms. Regular scouring of the membrane surface is necessary to minimize the buildup of biogrowth and to allow Permeate to flow more easily through the membranes.

Daily and periodic maintenance cleaning of the membranes using Sodium Hypochlorite is necessary to minimize the buildup of biogrowth and maintain the correct pressure differential across the membrane surface. The Permeate pumps are used both to pull permeate through the membrane and to back-pulse (reverse) flow through the membrane. Back-pulsing is necessary to keep the membrane clean and thereby keep the trans-membrane pressure in check which helps to maintain the flow of Permeate. The MBR process is controlled using a SCADA system.

Disinfection
The Permeate pumps pull flow through the membrane and pump it through to the outfall. Prior to discharge, the effluent passes through ultraviolet (UV) lights which are used to disinfect the effluent. There are 4 UV lights, each which has associated indicator lights on a display panel to show if each of the lights is functional. The operation of the lights is checked daily by the operators. The effluent flow is measured using a magnetic flow meter.

Digesters and Solids Handling
The two old clarifiers were converted to Aerobic Digesters as part of the plant upgrade. Waste solids from the MBRs are pumped to the #1 and then flows into the #2 digester tank. Approximately 20,000 gallons of digested solids are pumped to the belt filter press daily. The facility processes approximately 11,800 pounds of dried solids a day which are trucked to Growco in Kent for use in compost.

There are no significant industrial dischargers to this plant.

Staffing
The plant has three full-time operators who rotate shifts to cover the normal hours of operation from 7:00 am to 3:30 pm Monday through Friday. These same operators perform periodic rounds on the weekends and are on call 24/7 to respond to treatment plant and conveyance system problems. Two operators have obtained group I certification and one operator has obtained group II level certification.

The plant has recently completed a major plant expansion and upgrade that will likely serve the City’s need for the next 20 or more years.

DISCHARGE OUTFALL

In August 2001, the City placed into operation a new two-port submerged outfall into the Snoqualmie River. The outfall consists of a single 24-inch diameter line that splits into two 18-inch lines. The downstream pipe discharges 65 feet downstream from the upstream pipe. The two lines terminate in the Snoqualmie River and are equipped with tide flex check valves at the end of each pipe. The outfall discharges perpendicular to the river flow approximately 40 feet from the right bank.

RESIDUAL SOLIDS

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings) and from the MBRs. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill. Waste activated sludge purged from the MBRs is digested and filtered. The final solids are sent to Growco in Kent, Washington, to be used in compost.

The City of Duvall is covered under the Department of Ecology's *General Permit for Biosolids* which requires annual testing metals and an annual report submittal. The City has complied with the terms of the State of Washington's *General Permit for Biosolids.*

PERMIT STATUS

The previous permit for this facility was issued on March 10, 2000. The permit was modified twice. The first modification was on July 21, 2000. The second modification was on April 11, 2002, to incorporate the outfall change, the resulting dilution factor change and the removal of the metals limits. The most recent permit placed effluent limitations on 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, and Total Ammonia.

An application for permit renewal was submitted to the Department on December 31, 2003, and accepted by the Department on February 20, 2004.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection on January 17, 2006. The following table summarizes the recent inspection history. No violations were cited during these inspections.

TABLE 2: INSPECTION HISTORY

Facility Name	DUVALL STP
Permit ID	WA0029513C
Facility Type	MUNICIPAL
Facility Size	MINOR
Basin	ISLAND/SNOHOMISH (6,7)

Inspection Type	Inspector	Inspection Start Date	Completed Date
COMPLIANCE INSPECTION-WITHOUT SAMPLING	LAURA FRICKE	17-Jan-06	2-Feb-06
COMPLIANCE INSPECTION-WITH SAMPLING	LORI LEVANDER	7-Oct-03	6-Feb-04
COMPLIANCE INSPECTION-WITHOUT SAMPLING	CHUNG KI YEE	28-Nov-00	30-Nov-00
LABRATORY ACCREDITATION	AIMEE BENNETT	22-Apr-04	22-Apr-04
OPERATOR OUTREACH INSPECTION	CARL JONES	22-Jan-04	22-Jan-04

During the history of the previous permit, the Permittee had compliance issues early in the permit cycle due to strict water quality-based metals limits that were established based on the low dilution of the effluent in the receiving water. The outfall was modified and the dilution ratios were remodeled based on the new outfall configuration. The permit was modified and the WQ-based metals limits were removed from the permit. There were no violations of limits for other permit parameters during the permit cycle. Refer to Appendix D for a complete summary of DMR data from March 10, 2000, through December 31, 2005.

WET TEST RESULTS

The previous permit required two rounds of acute WET characterization testing. The test results show that the effluent met the performance standard outlined in WAC 174-205-050(2)(a)(i), a median of 80 percent survival in 100 percent effluent and not any single test less than 65 percent survival. These results demonstrate that there is no reasonable potential of acute toxicity.

TABLE 4: ACUTE WET RESULTS

City of Duvall WWTP Acute WET Test Results as % Survival in 100% Effluent

Test #	Sample Date	Start Date	Organism	Endpoint	% Survival
RMAR311	October 31, 2003	October 31, 2003	*Ceriodaphnia dubia*	48-hour Survival	100%
RMAR310	October 31, 2003	October 31, 2003	fathead minnow	96-hour Survival	100%
RMAR312	December 8, 2003	December 9, 2003	fathead minnow	96-hour Survival	100%
RMAR313	December 8, 2003	December 9, 2003	*Ceriodaphnia dubia*	48-hour Survival	100%
RMAR319	November 8, 2004	November 9, 2004	*Ceriodaphnia dubia*	48-hour Survival	100%
RMAR317	November 8, 2004	November 9, 2004	fathead minnow	96-hour Survival	93%

City of Duvall WWTP Acute WET Test Results as NOEC/LOEC in % Effluent

Test #	Sample Date	Start Date	Organism	Endpoint	NOEC	LOEC	MSDp
RMAR311	October 31, 2003	October 31, 2003	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	5.00%
RMAR310	October 31, 2003	October 31, 2003	fathead minnow	96-hour Survival	100	> 100	2.50%
RMAR312	December 8, 2003	December 9, 2003	fathead minnow	96-hour Survival	100	> 100	6.45%
RMAR313	December 8, 2003	December 9, 2003	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	9.06%
RMAR319	November 8, 2004	November 9, 2004	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	5.00%
RMAR317	November 8, 2004	November 9, 2004	fathead minnow	96-hour Survival	100	> 100	9.98%

The previous permit required annual chronic WET testing. Compliance with a WET limit means demonstrating no toxicity in a sample of effluent diluted to equal the critical concentration. The permit specified a chronic critical effluent concentration (CCEC) of 19.2 percent effluent.

TABLE 5: CHRONIC WET RESULTS

City of Duvall WWTP Chronic WET Test Results as NOEC/LOEC in % Effluent							
Test #	Sample Date	Start Date	Organism	Endpoint	NOEC	LOEC	MSDp
AQTX002719	June 26, 2000	June 27, 2000	*Ceriodaphnia dubia*	7-day Survival	50	> 50	
				Reproduction	9.6	50	24.45%
AQTX002720	June 26, 2000	June 27, 2000	fathead minnow	7-day Survival	50	> 50	7.25%
				Biomass	50	> 50	12.66%
				Weight	50	> 50	13.20%
AQTX002839	October 9, 2001	October 9, 2001	*Ceriodaphnia dubia*	7-day Survival	50	> 50	
				Reproduction	50	> 50	39.83%
AQTX002840	October 9, 2001	October 9, 2001	fathead minnow	7-day Survival	50	> 50	7.25%
				Biomass	50	> 50	11.84%
				Weight	50	> 50	9.69%
RMAR309	November 18, 2002	November 19, 2002	*Ceriodaphnia dubia*	7-day Survival	100	> 100	
				Reproduction	100	> 100	30.09%
RMAR308	November 18, 2002	November 19, 2002	fathead minnow	7-day Survival	100	> 100	15.01%
				Biomass	100	> 100	17.02%
				Weight	100	> 100	20.00%
RMAR315	December 8, 2003	December 9, 2003	*Ceriodaphnia dubia*	7-day Survival	100	> 100	
				Reproduction	100	> 100	18.26%
RMAR314	December 8, 2003	December 9, 2003	fathead minnow	7-day Survival	100	> 100	5.58%
				Biomass	100	> 100	14.61%
				Weight	100	> 100	12.21%
RMAR318	November 8, 2004	November 9, 2004	*Ceriodaphnia dubia*	7-day Survival	100	> 100	
				Reproduction	100	> 100	36.61%
RMAR316	November 8, 2004	November 9, 2004	fathead minnow	7-day Survival	100	> 100	10.43%
				Biomass	100	> 100	28.74%
				Weight	100	> 100	28.98%

NOEC – No observed effects concentration
LOEC – Lowest observed effects concentration
MSDp - percent minimum significant difference

Based on this testing, the Permittee does not require an acute or a chronic WET limit in the proposed permit. A re-characterization will be required in the permit based on the acute and chronic dilution factors for the existing outfall configuration.

The Permittee submitted all other required permit submittals in a timely manner.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The effluent is characterized as follows:

TABLE 6: WASTEWATER CHARACTERIZATION

POLLUTANT	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NON CONVENTIONAL COMPOUNDS							
AMMONIA (as N)	**2.7**	**mg/L**	**0.34**	**mg/L**	**288**	**4500 NH/3-D**	
CHLORINE (TOTAL RESIDUAL, TRC)							
DISSOLVED OXYGEN	**10.0**	**mg/L**	**7.0**	**mg/L**	**919**	**4500-OG**	
TOTAL KJELDAHL NITROGEN (TKN)	**3.1**	**mg/L**	**1.97**	**mg/L**	**3**	**EPA 351.3**	**0.1**
NITRATE PLUS NITRITE NITROGEN	**22**	**mg/L**	**14.07**	**mg/L**	**3**	**EPA 353.2**	**0.01**
OIL and GREASE	**1.9**	**mg/L**	**1.85**	**mg/L**	**3**	**EPA 1664**	**1**
PHOSPHORUS (Total)	**5.6**	**mg/L**	**4.03**	**mg/L**	**3**	**EPA 365.1**	**0.005**
TOTAL DISSOLVED SOLIDS (TDS)	**280**	**mg/L**	**250.00**	**mg/L**	**3**	**EPA 160.1**	**1**
OTHER							
Metals (data collected 7/2005 through 3/2006)							
Copper	**13**	**ug/l**	**7.67**	**ug/l**	**12**		
Mercury	**0.2**	**ug/l**	**0.20**	**ug/l**	**12**		
Silver	**0.9**	**ug/l**	**4.18**	**ug/l**	**12**		
Zinc	**72**	**ug/l**	**50.50**	**ug/l**	**12**		

The above-mentioned effluent characterization was completed prior to the start-up of the MBR process. Some additional metals analysis was done after the MBR start-up. This data was used to calculate whether there may be reasonable potential to exceed the water quality standards as shown in Appendix C. The permit will require a complete characterization of all priority pollutants in the effluent to be submitted with the application for permit renewal.

PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in an NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the surface water quality standards (Chapter 173-201A WAC), ground water standards (Chapter 173-200 WAC), sediment quality standards (Chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the state of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation**.** Effluent limits are not always developed for pollutants that may be in the discharge but not reported as

present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from *Duvall Wastewater Facility Plan* and the final design specification sheet as prepared by Parametrix and are as follows:

TABLE 7: DESIGN STANDARDS FOR CITY OF DUVALL WWTP.

Parameter	3 MBRs (current configuration)	4 MBRs (expected in 2-3 years)
Maximum Month Flow (mgd)	1.313	1.75
Maximum Day Flow (mgd)	2.5	3.3
BOD_5 influent loading (lb/day)	1909	2545
TSS influent loading (lb/day)	1845	2460
Ammonia (lb/day)	316	421

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD_5, and TSS are taken from Chapter 173-221 WAC are:

Table 8: Technology-based Limits.

Parameter	Limit
pH	Shall be within the range of 6.0 to 9.0 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
$CBOD_5$ (concentration)	Average Monthly Limit is the most stringent of the following: • 25 mg/L • may not exceed fifteen percent (15%) of the average influent concentration (85% removal) • Average Weekly Limit = 40 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: • 30 mg/L • may not exceed fifteen percent (15%) of the average influent concentration (85% removal) • Average Weekly Limit = 45 mg/L
Chlorine (if used in lieu of UV disinfection)	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

INTERIM TECHNOLOGY-BASED MASS LIMITS – $CBOD_5$

The $CBOD_5$ technology-based limits will apply during the high flow season of November through July. A TMDL-based limit applies during the low flow season from August through October (refer to section on CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA).

Monthly effluent mass loadings (lb/day) were calculated as the maximum monthly design flow (1.3125 MGD) x Concentration limit (25 mg/L) x 8.34 (conversion factor) = mass limit **274 lb/day**.

The weekly average effluent mass loading is calculated as (40/25) x monthly loading = **438 lb/day**.

INTERIM TECHNOLOGY-BASED MASS LIMITS – TSS

Monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (1.3125 MGD) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit **328 lb/day**.

The weekly average effluent mass loading is calculated as (45/30) x monthly loading = **493 lb/day**.

FINAL TECHNOLOGY-BASED MASS LIMITS – $CBOD_5$

The $CBOD_5$ technology-based limits will apply during the high flow season of November through July. A TMDL-based limit applies during the low flow season from August through October (refer to section on CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA).

Monthly effluent mass loadings (lb/day) were calculated as the maximum monthly design flow (1.75 MGD) x concentration limit (25 mg/L) x 8.34 (conversion factor) = mass limit **365 lb/day**.

The weekly average effluent mass loading is calculated as (40/25) x monthly loading = **584 lb/day**.

FINAL TECHNOLOGY-BASED MASS LIMITS – TSS

Monthly effluent mass loadings (lb/day) were calculated as the maximum monthly design flow (1.75 MGD) x concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit **438 lb/day**.

The weekly average effluent mass loading is calculated as (45/30) x monthly loading = **657 lb/day**.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established surface water quality standards. The Washington State surface water quality standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's water quality standards for surface waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the water quality standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

ANTIDEGRADATION

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the Washington State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the water body's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses. The critical condition for the pollutants in this discharge is the low flow period.

MIXING ZONES

This permit authorizes an acute and a chronic mixing zone around the point of discharge as allowed by Chapter 173-201A WAC, *Water Quality Standards for Surface Waters of the State of Washington*. The water quality standards stipulate some criteria be met before a mixing zone is allowed. The requirements and Ecology's actions are summarized as follows:

1. *The allowable size and location be established in a permit*.
   This permit specifies the size and location of the allowed mixing zone.
2. *Fully apply "all known, available and reasonable methods of treatment" (AKART).*
   The technology-based limitations determined to be AKART are discussed in an earlier section of this fact sheet.
3. *Consider critical discharge condition.*
   The critical discharge condition is often pollutant-specific or water body-specific and is discussed above.
4. *Supporting information clearly indicates the mixing zone would not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses, result in damage to the ecosystem or adversely affect public health*.
   The Department of Ecology has reviewed the information on the characteristics of the discharge, receiving water characteristics and the discharge location. Based on this information, Ecology believes this discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem or adversely affect public health.
5. *Water quality criteria shall not be violated (exceeded) outside the boundary of a mixing zone*.
   A reasonable potential analysis, using procedures established by USEPA and the Department of Ecology, was conducted for each pollutant to assure there will be no violations of the water quality criteria outside the boundary of a mixing zone.

6. *The size of the mixing zone and the concentrations of the pollutants shall be minimized.*
The size of the mixing zone (in the form of the dilution factor) has been minimized by the use of design criteria with low probability of occurrence. For example, the reasonable potential analysis used the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor and the low flow occurring once in every ten years. The concentrations of the pollutants in the mixing zone have been minimized by requiring pollution prevention measures where applicable.

7. *Maximum size of mixing zone*
The authorized mixing zone does not exceed the maximum size restriction.

8. *Acute Mixing Zone*

   A. *Acute criteria met as near to the point of discharge as practicably attainable*
   The acute criteria have been determined to be met at ten percent of the distance of the chronic mixing zone.

   B. *The concentration of, and duration and frequency of exposure to the discharge, will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.*
   The toxicity of pollutants is dependent upon the exposure which in turn is dependent upon the concentration and the time the organism is exposed to that concentration. For example EPA gives the acute criteria for copper as "freshwater aquatic organisms and their uses should not be affected unacceptably if the one-hour average concentration (in µg/l) does not exceed the numerical value given by $(0.960)(e^{(0.9422[\ln(\text{hardness})] - 1.464)})$ more than once every three years on the average." The limited acute mixing zone authorized for this discharge will assure that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water assuring that it will not cause translocation of indigenous organism near the point of discharge.

   C. *Comply with size restrictions*
   The mixing zone authorized for this discharge meets the size restrictions of WAC 173-201A.

9. *Overlap of Mixing Zones*
This mixing zone does not overlap another mixing zone.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to the Snoqualmie River, which is designated as a Class A freshwater receiving water in the vicinity of the outfall. Other nearby point source outfalls include the city of North Bend, the city of Snoqualmie, Weyerhaeuser Snoqualmie Mill, and Tokul Creek Hatchery Significant nearby non-point sources of pollutants include silvicultural and agricultural activities. Characteristic uses include the following:

> water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Parameter	**Water Quality Criteria**
Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

SNOQUALMIE RIVER TOTAL MAXIMUM DAILY LOAD STUDY

On July 3, 1996, the Snoqualmie River Total Maximum Daily Load (TMDL) Study was approved by the Environmental Protection Agency. This TMDL limits ammonia, BOD_5 and fecal coliform bacteria discharged in the Snoqualmie River in the vicinity of the Duvall WWTP and downstream through the main stem Snoqualmie to its confluence with the Skykomish River. The TMDL study evaluated options which included discharges at Fall City and Carnation WWTPs. Since Carnation is projected to start up in 2007, this permit is based on the 5-plant scenario. (Refer to Appendix C, Table C-5, TMDL Allocation for 5-plant scenario.) The City of Duvall TMDL for $CBOD_5$ is 94.0 lb/day and the TMDL for ammonia is 31.3 lb/day. Compliance with the technology-based standards for fecal coliform will meet the requirements of the TMDL.

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

The maximum boundaries of the mixing zones are defined as follows:

Outfall #001:

1. The minimum river width at critical conditions is estimated at 110 feet based on hydraulic model (HEC-RAS) analyses using recent survey data. The width of the mixing zone is limited to 25 percent of the river width or 27.5 feet (8.38 m).

2. The length of the mixing zone is limited to 410 feet total length. The mixing zone extends 100 feet upstream and 310 feet downstream of the diffusion structure (300 feet plus the depth of water over the discharge port).

3. The length of the zone of acute criteria exceedance is limited to 10 feet upstream and 31 feet downstream of the diffusion structure.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of RIVPLUM5 model as provided in the City of Duvall's Engineering Report, *Wastewater Treatment Plant Outfall,* dated April 2000 and the amendment to this document the Engineering Report Amendment, *Wastewater Treatment Plant Outfall*, January 2001. The dilution factors were based on a 4 MBR design with a monthly maximum design flow of 1.75 MGD. The dilution factors have been determined to be:

TABLE 9: DILUTION FACTORS

	Acute[1]		Chronic[2]
Critical Season	**Upstream Port**	**Downstream Port**	**Combined**
Wet Season	5.2	6.2	64.2
Dry Season	11.8	12.8	71.2

[1] For acute dilution, the 2 1/2 % utilization limitation applies to each individual port.

[2] For chronic dilution, the 25% utilization limitation applies to the combined flow.

It is noted that the current plant configuration includes only 3 MBRs with a design flow of 1.3 mgd; the 4th MBR is not expected to be added until approximately 2008. Therefore, the dilution factors shown above are believed to be somewhat conservative for the current lower plant flows.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants—their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The critical condition for the Snoqualmie River is the seven-day average low river flow with a recurrence interval of 20 years (7Q20). Ambient data at critical conditions in the vicinity of the Duvall outfall was taken from the TMDL study. This study considered both historical data and intensive in-river monitoring together with comprehensive sampling of the point source discharges along the river. The initial low flow study was conducted during July - September of 1989. Additional confirmation sampling was conducted during September 1991 to verify the QUAL2E model developed for the TMDL. The Snoqualmie River Total Maximum Daily Load was approved by the Environmental Protection Agency on July 3, 1996.

In May 1999 the City of Duvall submitted a report entitled *Mixing Zone Study and TMDL Alternatives Analysis* (May 1999) prepared by Cosmopolitan Engineers and a request for alternative effluent limits which would be compliant with the TMDL. The exchange of lower ammonia limits for higher $CBOD_5$ limits was evaluated with the QUAL2E model and found to be protective of the dissolved oxygen standard. The exchange ratio for $CBOD_5$ to Ammonia of 2.5:1 was used in this permit to calculate and impose an equivalent $CBOD_5$ limit.

TABLE 10: AMBIENT DATA AT CRITICAL CONDITIONS IN THE VICINITY OF THE OUTFALL

Parameter	**Value Used**
7Q20 low flow	465 cfs
Temperature	20.3°C
pH (high)	7.8
Dissolved Oxygen	8.0 mg/L
Total Ammonia-N	0.04 mg/L
Fecal Coliform	41/100 mL dry weather (>100/100 mL storm related)
Hardness	25 mg/L as $CaCO_3$

$CBOD_5$ (High River Flow Period)--Under critical conditions there is no predicted violation of the water quality standards for surface waters. Therefore, the technology-based effluent limitation for $CBOD_5$ was placed in the permit.

The impact of CBOD on the receiving water was modeled using the Streeter-Phelps model at critical condition and with the technology-based effluent limitation for $CBOD_5$ described under "Technology-Based Effluent Limitations" above. The calculations used to determine dissolved oxygen impacts are shown in Appendix C, Table C-3.

$CBOD_5$ (Low River Flow Period)--Under critical conditions there was a prediction of a violation of the dissolved oxygen criterion for the receiving water. TMDL-based mass limits were imposed as follows: Equivalent $CBOD_5$ effluent limit of 171.8 lb/day maximum daily limit (MDL) and 130.4 lb/day average monthly limit (AML) were found to be protective of the dissolved oxygen criterion.[1]

In accordance with NPDES regulations at 40 CFR 122.45(d), all permit limits must be expressed, unless impracticable, as both average monthly (AML) and maximum daily (MDL) values. Both Ecology guidance (Permit Writer's Manual p. VI-26) and EPA Guidance (Technical Support Document for Water Quality-based Toxic Control p. 99) provide the basis for calculating an average monthly limit (AML) from waste load allocation or maximum daily limit (MDL) based on the inherent variable of the data set and the number of sample results expected per month. Refer to Appendix C, Table C-6, Equivalent $CBOD_5$ as calculated from DMR data and Table C-7, Calculation of AML for Equivalent $CBOD_5$.

[1] Equivalent $CBOD_5$ is defined by the following equation:
Equivalent $CBOB_5$ (lb/day) = CBOD (lb/day) + 2.5 x ammonia (lb/day).
Therefore, using the maximum daily limits for $CBOB_5$ and ammonia shown in Appendix C, Table C-5, the limit for effective $CBOB_5$ is calculated as follows: Effective $CBOD_5$ = 94.0 + 2.5 x 31.1 = 171.8

The technology-based concentration limitations will be protective of water quality as long as the more strict mass limits are adhered to as well. Refer Appendix C, Table C-5, excerpt from the Department of Ecology's *Snoqualmie River Total Maximum Daily Load Study*, May 1994, Table 8: Summary of Contaminant Loads, five WWTP model.

Temperature and pH (High River Flow Period)--The impact of pH and temperature were modeled using the calculations from EPA, 1988. The input variables were dilution factor 5.2 (worst case dilution), upstream temperature 17.5^{o}C, upstream pH 7.0, upstream alkalinity 25.7 (as mg $CaCO_3$/L), effluent temperature 20.0^{o}C, effluent pH of 6, effluent pH of 9, and effluent alkalinity 56.0 (as mg $CaCO_3$/L). Refer to Appendix C, Table C-2.

Under critical conditions there was a prediction of a violation of the pH criteria for the receiving water. An effluent limit of 6.2 to 9.0 for pH was found to meet the water quality criterion for pH. Therefore, these limits were imposed. Temperature was not limited.

Temperature and pH (Low River Flow Period)--The impact of pH and temperature were modeled using the calculations from EPA, 1988. The input variables were dilution factor 11.8 (worst case dilution), upstream temperature 17.5^{o}C, upstream pH 7.0, upstream alkalinity 25.7 (as mg $CaCO_3$/L), effluent temperature 20.0^{o}C, effluent pH of 6.0, effluent pH of 9.0, and effluent alkalinity 56.0 (as mg $CaCO_3$/L).

Under critical conditions there is no predicted violation of the water quality standards for surface waters. Therefore, the technology-based effluent limitations for high and low pH were placed in the permit and temperature was not limited. Refer to Appendix C, Table C-2.

Fecal Coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of DFc=64.2.

Under critical conditions there is no predicted violation of the water quality standards for surface waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the water quality standards for surface waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: **ammonia, and heavy metals, copper, mercury, silver and zinc.** A reasonable potential analysis (See Appendix C, Table C-1) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for (ammonia, and heavy metals, copper, mercury, silver and zinc.) to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 at the critical condition.

An ambient background level of zero was used for copper, mercury, silver and zinc. Calculations using all applicable data resulted in a determination that there is no reasonable potential for this discharge to cause a violation of water quality standards. This determination assumes that the Permittee meets the other effluent limits of this permit.

Ammonia requires a TMDL-based limit. Under critical conditions there was a prediction of a violation of the dissolved oxygen criterion for the receiving water. The equivalent $CBOD_5$ limit included the effects of both $CBOD_5$ and ammonia on dissolved oxygen and the calculation for equivalent $CBOD_5$ include ammonia. The equivalent CBOD limit was found to be protective of the dissolved oxygen criterion and therefore was imposed. Refer Appendix C, Table C-5, excerpt from the Department of Ecology's *Snoqualmie River Total Maximum Daily Load Study*, May 1994, Table 8: Summary of Contaminant Loads, five WWTP model.

WHOLE EFFLUENT TOXICITY

The water quality standards for surface waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, $EC_{50,}$ IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Ecology Publications Distribution Center at (360) 407-7472 for a copy. Ecology recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

An effluent characterization for acute and chronic toxicity was conducted during the previous permit term. In accordance with WAC 173-205-060, the Permittee must repeat this effluent characterization for the following reason:

> **The Permittee has made changes to processes, materials, or treatment that could result in an increase in effluent toxicity. In accordance with WAC 173-205-060(1), the proposed permit requires another effluent characterization for toxicity.**

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the effluent is likely to have chemicals of concern for human health. The discharger's high priority status is based on knowledge of data or process information indicating regulated chemicals occur in the discharge.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and the Department's *Permit Writer's Manual* (Ecology Publication 92-109, July 1994). **The determination indicated that the discharge has no reasonable potential to cause a violation of water quality standards, thus an effluent limit is not warranted.**

SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the sediment management standards.

GROUND WATER QUALITY LIMITATIONS

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED March 10, 2000

INTERIM LOW FLOW PERIOD

Parameter	Existing Permit Limits		Proposed Permit Limits	
	Monthly Average	**Weekly Average**	**Monthly Average**	**Weekly Average**
Flow	0.75 MGD	NA	**1.313 MGD**	**NA**
($CBOD_5$)	18.3 mg/L (114 lb/day)	27.5 mg/L (see note a)	**25 mg/L** **85% removal**	**40 mg/L**
Total Suspended Solids	30 mg/L (188 lb/day) 81% removal	45 mg/L (281 lb/day)	**30 mg/L** **(328 lb/day)** **85% removal**	**45 mg/L** **(493 lb/day)**
Fecal Coliform Bacteria	200 cfu/100 mL	400 cfu/100 mL	200 cfu/100 mL	400 cfu/100 mL

Parameter	Existing Permit Limits		Proposed Permit Limits	
	Monthly Average	**Weekly Average**	**Monthly Average**	**Weekly Average**
pH	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.		Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Total Ammonia (as NH3-N)	1.6 mg/L (10.0 lb/day)	(see note a)	**NA**	**NA**
Equivalent $CBOD_5$ [a]	NA	203.5 lb/day	**130.4 lb/day**	**171.8 lb/day**
$CBOD_5$	NA		**NA**	**NA**
	[a] Equivalent CBOD (5-day) loading not to exceed 203.5 lb/day. Equivalent CBOD (5-day) loading is defined by the following equation: CBOD5 lb/day + (2.5 * NH3-N lb/day). Where CBOD (5-day) and total ammonia (as NH3-N) are measurements from the same daily composite sample.		[a] Equivalent CBOD5 is defined by the following equation: Equivalent CBOB5 (lb/day) = CBOD (lb/day) +2.5 x ammonia (lb/day) Where CBOD5 and total ammonia (as NH3-N) are measurements from the same daily composite sample.	

INTERIM HIGH FLOW PERIOD

Parameter	Existing Permit Limits		Proposed Permit Limits	
	Monthly Average	**Weekly Average**	**Monthly Average**	**Weekly Average**
Flow (MGD)	0.75 MGD		**1.313 MGD**	
$CBOD_5$	25 mg/L, 188 lb/day 75% removal	40 mg/L, 300 lb/day	25 mg/L **(274 lb/day) 85% removal**	40 mg/L **(438 lb/day)**
Total Suspended Solids	30 mg/L, 225 lb/day 81% removal	45 mg/L, 338 lb/day	30 mg/L **(328 lb/day) 85% removal**	45 mg/L **(493 lb/day)**
Fecal Coliform Bacteria	200 cfu/100 mL	400 cfu/100 mL	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.		Daily minimum is equal to or greater than **6.2** and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Total Ammonia (as NH3-N)	5 mg/L (37.5 lb/day)	8 mg/L (60 lb/day)	**NA**	**NA**

FINAL LOW FLOW PERIOD

Parameter	Existing Permit Limits		Proposed Permit Limits	
	Monthly Average	**Weekly Average**	**Monthly Average**	**Weekly Average**
Flow	0.75 MGD		**1.75 MGD**	
($CBOD_5$	18.3 mg/L, (114 lb/day)	27.5 mg/L (see note a)	**25 mg/L 85% removal**	**40 mg/L**
Total Suspended Solids	30 mg/L, (188 lb/day) 81% removal	45 mg/L, (281 lb/day)	**30 mg/L (438 lb/day) 85% removal**	**45 mg/L (657 lb/day)**
Fecal Coliform Bacteria	200 cfu/100 mL	400 cfu/100 mL	200 cfu/100 mL	400 cfu/100 mL
pH	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.		Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Total Ammonia (as NH3-N)	1.6 mg/L (10.0 lb/day)	(see note a)	**NA**	**NA**
Equivalent $CBOD_5$ [a]	NA	203.5 lb/day	**130.4 lb/day**	**171.8 lb/day**
$CBOD_5$	NA		**NA**	**NA**
	[a] Equivalent CBOD (5-day) loading not to exceed 203.5 lb/day. Equivalent CBOD (5-day) loading is defined by the following equation: CBOD5 lb/day + (2.5 * NH3-N lb/day). Where CBOD (5-day) and total ammonia (as NH3-N) are measurements from the same daily composite sample.		[a] Equivalent CBOD5 is defined by the following equation: Equivalent CBOB5 (lb/day) = CBOD (lb/day) +2.5 x ammonia (lb/day) Where CBOD5 and total ammonia (as NH3-N) are measurements from the same daily composite sample.	

FINAL HIGH FLOW PERIOD

Parameter	Existing Permit Limits		Proposed Permit Limits	
	Monthly Average	**Weekly Average**	**Monthly Average**	**Weekly Average**
Flow (MGD)	0.75 MGD		**1.75 MGD**	
$CBOD_5$	25 mg/L, 188 lb/day 75% removal	40 mg/L, 300 lb/day	25 mg/L **(365 lb/day) 85% removal**	40 mg/L **(584 lb/day)**
Total Suspended Solids	30 mg/L, 225 lb/day 81% removal	45 mg/L, 338 lb/day	30 mg/L **(438 lb/day) 85% removal**	45 mg/L **(657 lb/day)**
Fecal Coliform Bacteria	200 cfu/100 mL	400 cfu/100 mL	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.		Daily minimum is equal to or greater than **6.2** and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Total Ammonia (as NH3-N)	5 mg/L (37.5 lb/day)	8 mg/L (60 lb/day)	**NA**	**NA**

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (July 2002) for an activated sludge plant with less that 2.0 MGD average design flow.

LAB ACCREDITATION

With the exception of certain parameters, the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* The laboratory at this facility is accredited for: BOD_5, $CBOD_5$, total suspended solids, pH and fecal coliform.

OTHER PERMIT CONDITIONS

REPORTING AND RECORD KEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment. The proposed permit requires submission of an updated O&M manual for the treatment plant.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems, the Permittee is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW, Chapter 173-308 WAC "Biosolids Management," and Chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the King County Health Department.

PRETREATMENT

FEDERAL AND STATE PRETREATMENT PROGRAM REQUIREMENTS

Under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986), the Department of Ecology (Department) has been delegated authority to administer the Pretreatment Program (i.e. act as the Approval Authority for oversight of delegated Publicly Owned Treatment Works [POTWs])**.** Under this delegation of authority, the Department has exercised the option of issuing wastewater discharge permits for significant industrial users discharging to POTWs which have not been delegated authority to issue wastewater discharge permits.

There are a number of functions required by the Pretreatment Program which the Department is delegating to such POTWs because they are in a better position to implement the requirements (for example, tracking the number and general nature of industrial dischargers to the sewerage system). The requirements for a Pretreatment Program are contained in Title 40, Part 403 of the Code of Federal Regulations. Under the requirements of the Pretreatment Program (40 CFR 403.8(f)(1)(iii)), the Department is required to approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) (40 CFR 403.8 (f)(1)(i)).

The Department is responsible for issuing state waste discharge permits to SIUs and other industrial users of the Permittee's sewer system. Industrial dischargers must obtain these permits from the Department prior to the Permittee accepting the discharge (WAC 173-216-110(5)) (Industries discharging wastewater that is similar in character to domestic wastewater are not required to obtain a permit. Such dischargers should contact the Department to determine if a permit is required.). Industrial dischargers need to apply for a state waste discharge permit sixty (60) days prior to commencing discharge. The conditions contained in the permits will include any applicable conditions for categorical discharges, loading limitations included in contracts with the POTW, and other conditions necessary to assure compliance with state water quality standards and biosolids standards.

The Department requires this POTW to fulfill some of the functions required for the Pretreatment Program in the NPDES permit (for example, tracking the number and general nature of industrial dischargers to the sewage system). The POTW's NPDES permit will require that all SIUs currently discharging to the POTW be identified and notified of the requirement to apply for a wastewater discharge permit from the Department. None of the obligations imposed

on the POTW relieve an industrial or commercial discharger of its primary responsibility for obtaining a wastewater discharge permit (if required), including submittal of engineering reports prior to construction or modification of facilities (40 CFR 403.12(j) and WAC 173-216-070 and WAC 173-240-110, et seq.).

WASTEWATER PERMIT REQUIRED

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

ANNUAL SUBMITTAL OF LIST OF INDUSTRIAL USERS

This provision requires the POTW to submit annually a list of existing and proposed SIUs and PSIUs. This requirement is intended to update the Department on an annual basis of the status of industrial users in the POTW's service area, without requiring the POTW to go through the process of performing a formal Industrial User Survey. This provision is normally applied to POTWs not serving industrial or commercial users. Although this permit does not require performance of an Industrial User Survey, the Permittee is nevertheless required under the previous section, to take adequate continuous routine measures to identify existing and new industrial discharges.

DUTY TO ENFORCE DISCHARGE PROHIBITIONS

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition, wastes with excessive BOD, petroleum-based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, storm water and other direct inflow sources, and waste waters significantly affecting system hydraulic loading, which do not require treatment.

SUPPORT BY THE DEPARTMENT FOR DEVELOPING PARTIAL PRETREATMENT PROGRAM BY POTW

The Department has committed to providing technical and legal assistance to the Permittee in fulfilling these joint obligations, in particular assistance with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

OUTFALL EVALUATION

Proposed permit Condition S.11 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to determine if sediment is accumulating in the vicinity of the outfall.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary, to meet water quality standards, sediment quality standards, or ground water standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five (5) years.

REFERENCES FOR TEXT AND APPENDICES

Duvall Documents

Duvall Wastewater Facility Plan, Parametrix, Inc., October 2001.

Wastewater Treatment Plant Outfall Improvements, Engineering Report Amendment, Parametrix, Inc., January 2001.

Wastewater Treatment Plant Outfall Improvements, Engineering Report, Parametrix, Inc., April 2000.

Mixing Zone Study and TMDL Alternatives Analysis, Cosmopolitan Engineering Group, May 1999.

Other Reference Documents

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

Laws and Regulations (http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html)

Washington State Department of Ecology, 2002. Permit Writer's Manual. Publication Number 92-109.

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A—PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page one of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public Notice of Application (PNOA) was published on March 2, 2004, and March 9, 2004, in the *King County Journal* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department published a Public Notice of Draft (PNOD) on June 6, 2006, in the *King County Journal* to inform the public that a draft permit and fact sheet were available for review. Interested persons were invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents were available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments were mailed to:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30)-day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (425) 649-7201, or by writing to the address listed above.

This permit and fact sheet were written by Karen Burgess.

APPENDIX B—GLOSSARY

Acute Toxicity—The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART—An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality—The existing environmental condition of the water in a receiving water body.

Ammonia—Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation—The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation—The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)—Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5—Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass—The intentional diversion of waste streams from any portion of a treatment facility.

$CBOD_5$—The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD5 is given in 40 CFR Part 136.

Chlorine—Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity—The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)—The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)—The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling—A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample—A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity—Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous Monitoring—Uninterrupted, unless otherwise noted in the permit.

Critical Condition—The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor—A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10 percent by volume and the receiving water 90 percent.

Engineering Report—A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria—Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample—A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User—A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater—Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)—"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference—A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility—A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation—The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)—The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility—A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone—A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in Washington State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)—The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

Pass-through—A discharge which exits the POTW into waters of the state in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of state water quality standards.

pH—The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User—A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 percent of treatment plant design capacity criteria and discharges <25,000 gallons per day; or

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (for example, facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)—A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)—

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N.

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph two, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters—Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater—That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit—A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)—Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset—An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit—A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C—TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at (http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Table C-1: Reasonable Potential Calculations

Effluent Data	provided by Mike Myers in email						
	Units	Max.	Average	St. Deviation	Coef. Of Variation	Percentile used	95th Percentile
Ammonia (data from DMR Summary)		4.9	0.38		**0.600**	as in TSD Calc	**4940.0**
Copper	ug/l	13.00	7.67	3.091206165	0.23778509	0.95	12.45
Mercury	ug/l	0.20	0.20		0.6	0.95	0.2
Silver	ug/l	0.90	4.18	0.238537209	0.265041343	0.95	0.63
Zinc	ug/l	72.00	50.50	9.115005943	0.126597305	0.95	64.3

Notes: Two data point s since start up of MBR
12/22/2005 Silver data point not used. Possible outlayer
For Mercury, 0.6 used for coefficient of variation since std. dev. Was 0.0 and results were not give with more significant figures.

Dilution Factors	from report Appendix H			
River Flow (Qa)	7Q20 Flow cfs	mdg	River Fraction Allowed Acute	Chronic
Annual	443.00	286.30	0.025	0.25
Wet Season	684.00	442.05	0.025	0.25
Dry Season	456.00	294.70	0.025	0.25

Effluent Flow (Qe)	Max. Day mgd	Max. Month mdg
Annual	5.25	1.75
Wet Season	5.25	1.75
Dry Season	1.37	1.05

Dilution (Qa+Qe)/Qe

	Acute Upstream Port	Acute Downstream Port	Chronic
Annual	**3.7**	**4.7**	**42.9**
Wet Season	**5.2**	**6.2**	**65.2**
Dry Season	**11.8**	**12.8**	**72.2**

Effluent Concentration at 65 feet from report appendix I, Downstream Port background concentrations

	Wet Season	Dry Season	
Acute Dilution at 65 feet	56.6	117.60	from RIVPLUME appendix H
Chronic Dilutions at 65 feet	170	153.5	

DOWNSTREAM PORT BACKGROUND		**Wet Season**						**Dry Seson**					
Parameter	Units	Upstream Ambient	Effluent Concentration - 95th Percentile	At 65 feet dilution for Acute	At 65 feet dilution for Chronic	Background Conc. Acute, Calculated	Background Conc. Chronic, Calculated	Upstream Ambient	Effluent Concentration - 95th Percentile	At 65 feet dilution for Acute	At 65 feet dilution for Chronic	Background Conc. Acute, Calculated	Background Conc. Chronic, Calculated
AMMONIA			4940.0	56.6	170.0	**87.28**	**29.06**		4940.0	117.6	153.5	**42.01**	**32.18**
COPPER			12.5	56.6	170.0	**0.22**	**0.07**		12.5	117.6	153.5	**0.11**	**0.08**
MERCURY			0.2	56.6	170.0	**0.00**	**0.00**		0.2	117.6	153.5	**0.00**	**0.00**
SILVER			0.6	56.6	170.0	**0.01**	**0.00**		0.6	117.6	153.5	**0.01**	**0.00**
ZINC			64.3	56.6	170.0	**1.14**	**0.38**		64.3	117.6	153.5	**0.55**	**0.42**

Notes:
Acute and Chronic Dilution factors at 65 feet taken from the Engineering Report Amendment, Wastewater Treatment Plant Outfall Improvements, January 2001 , Appendix H, Caclulated using RIVPLUM

Hardness Data	from report	mg/L	
Effluent Hardness data	June-99	**47**	(report ref. page 2-3)
	July-99	52	
	August-99	61	
	September-99	64	
Critical Receiving water hardness		**25.7**	(report ref. page 2-1)

Lowest effluent hardness was used with the critical receiving water hardness valvue to compute the plume harndess for the purpose of deriving hardness based acute and chronic metals water quality standards.

Applicable Hardness and TSS for calc. WQS for hardness dependent metals

	Upstream Port		Downstream		Chronic		
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	
Applicable Dilution Ratio	5.21	11.76	6.21	12.76	65.15	72.17	
Plume Hardness (mg/L CaCO3)	**29.1**	**27.4**	**28.7**	**27.2**	26.0	26.0	
Ambient Critical TSS (mg/L)	**12.60**	**5.50**	**12.60**	**5.50**	12.60	5.50	from report page 2-7
s=TSS from critival period	s	s	s	s	s	s	

Applicable Water Quality Standards

		Plume Hardness (mg/L CaCO3)	Ambient Critical TSS (mg/L)	s=TSS from critival period	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	State Water Quality Standard Acute ug/L	State Water Quality Standard Chronic ug/L
Upstream Port								
Wet Season								
	AMMONIA unionized -see seperate spreadsheets for FW criteria						19304	1559
	COPPER	29.13	12.60	S	0.805	0.805	5.32	3.96
	MERCURY	29.13	12.60		0.85		2.10	0.012
	SILVER	29.13	12.60		0.85		0.41	NA
	ZINC	29.13	12.60		0.802	0.802	40.25	36.75
Dry Season								
	AMMONIA unionized -see seperate spreadsheets for FW criteria						19304	1559
	COPPER	27.37	5.50	S	1.000	1.000	5.02	3.75
	MERCURY	27.37	5.50		0.85		2.10	0.012
	SILVER	27.37	5.50		0.85		0.37	NA
	ZINC	27.37	5.50		0.971	0.971	38.18	34.86
Downstream								
Wet Season								
	AMMONIA unionized -see seperate spreadsheets for FW criteria						19304	1559
	COPPER	28.65	12.60	S	0.805	0.805	5.24	3.90
	MERCURY	28.65	12.60		0.85		2.10	0.012
	SILVER	28.65	12.60		0.85		0.40	NA
	ZINC	28.65	12.60		0.802	0.802	39.69	36.24
Dry Season								
	AMMONIA unionized -see seperate spreadsheets for FW criteria						19304	1559
	COPPER	27.25	5.50	S	1.000	1.000	5.00	3.74
	MERCURY	27.25	5.50		0.85		2.10	0.012
	SILVER	27.25	5.50		0.85		0.37	NA
	ZINC	27.25	5.50		0.971	0.971	38.03	34.73

Reasonble Potential

Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	State Water Quality Standard Acute ug/L	State Water Quality Standard Chronic ug/L	Max concentration at edge of... Acute Mixing Zone ug/L	Max concentration at edge of... Chronic Mixing Zone ug/L	LIMIT REQ'D?	CALCULATIONS Effluent percentile value	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
DOUBLE PORT OUTFALL (UPSTREAM)																	
WET SEASON																	
AMMONIA unionized -see seperate spreadsheets for FW criteria				19304	1559	654.49	52.34	NO	0.95	0.990	4940.00	0.60	0.55	288	0.69	5.2	65.2
COPPER	0.805	0.805		5.3231	3.9565	2.58	0.21	NO	1.00	0.652	12.45	0.24	0.23	7	1.34	5.2	65.2
MERCURY	0.850			2.1000	0.0120	0.07	0.01	NO	1.00	0.652	0.20	0.60	0.55	7	2.01	5.2	65.2
SILVER	0.850			0.4135	NA	0.14	0.01	NO	1.00	0.652	0.63	0.27	0.26	7	1.39	5.2	65.2
ZINC	0.802	0.802		40.2477	36.7522	11.59	0.93	NO	1.00	0.652	64.30	0.13	0.13	7	1.17	5.2	65.2
DRY SEASON																	
AMMONIA unionized -see seperate spreadsheets for FW criteria				19304	1559	290.07	47.25	NO	0.95	0.990	4940.00	0.60	0.55	288	0.69	11.8	72.2
COPPER	1.000	1.000		5.0195	3.7513	1.42	0.23	NO	1.00	0.652	12.45	0.24	0.23	7	1.34	11.8	72.2
MERCURY	0.850			2.1000	0.0120	0.03	0.01	NO	1.00	0.652	0.20	0.60	0.55	7	2.01	11.8	72.2
SILVER	0.850			0.3715	NA	0.06	0.01	NO	1.00	0.652	0.63	0.27	0.26	7	1.39	11.8	72.2
ZINC	0.971	0.971		38.1775	34.8618	6.22	1.01	NO	1.00	0.652	64.30	0.13	0.13	7	1.17	11.8	72.2
DOUBLE PORT OUTFALL (DOWNSTREAM)																	
WET SEASON																	
AMMONIA unionized -see seperate spreadsheets for FW criteria			87.2792	19304	1559	622.32	138.28	NO	0.95	0.990	4940.00	0.60	0.55	288	0.69	6.2	65.2
COPPER	0.805	0.805	0.2200	5.2412	3.9012	2.35	0.42	NO	1.00	0.652	12.45	0.24	0.23	7	1.34	6.2	65.2
MERCURY	0.850		0.0035	2.1000	0.0120	0.06	0.01	NO	1.00	0.652	0.20	0.60	0.55	7	2.01	6.2	65.2
SILVER	0.850		0.0111	0.4020	NA	0.13	0.02	NO	1.00	0.652	0.63	0.27	0.26	7	1.39	6.2	65.2
ZINC	0.802	0.802	1.1360	39.6901	36.2431	10.68	2.05	NO	1.00	0.652	64.30	0.13	0.13	7	1.17	6.2	65.2
DRY SEASON																	
AMMONIA unionized -see seperate spreadsheets for FW criteria			42.0068	19304	1559	306.04	88.67	NO	0.95	0.990	4940.00	0.60	0.55	288	0.69	12.8	72.2
COPPER	1.000	1.000	0.1059	4.9985	3.7371	1.41	0.34	NO	1.00	0.652	12.45	0.24	0.23	7	1.34	12.8	72.2
MERCURY	0.850		0.0017	2.1000	0.0120	0.03	0.01	NO	1.00	0.652	0.20	0.60	0.55	7	2.01	12.8	72.2
SILVER	0.850		0.0054	0.3686	NA	0.06	0.02	NO	1.00	0.652	0.63	0.27	0.26	7	1.39	12.8	72.2
ZINC	0.971	0.971	0.5468	38.0339	34.7308	6.24	1.55	NO	1.00	0.652	64.30	0.13	0.13	7	1.17	12.8	72.2

Effluent Limit

The effluent shows no reasonable potential to cause an exceedance of the WQS outside the acute boundry.

Table C-2: Calculation of pH mixture

Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Facility Name: Duvall

		CaCO3 (mg/L)
Grab effluent hardness samples (source: WWTP Outfall Improvements, Engineering Report Amendment, p. 2-3)	Jun-99	47
	Jul-99	52
	Aug-99	61
	Sep-99	64
	avearge	56

INPUT	Wet Season (High Flow)			Dry Season (Low Flow)	
	Min. pH	Min. pH	Max. pH	Min. pH	Max. pH
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	5.200	5.200	5.200	11.800	11.800
1. UPSTREAM/BACKGROUND CHARACTERISTICS					
Temperature (deg C):	17.50	17.50	17.50	17.50	17.50
pH:	7.00	7.00	7.00	7.00	7.00
Alkalinity (mg CaCO3/L):	25.70	25.70	25.70	25.70	25.70
2. EFFLUENT CHARACTERISTICS					
Temperature (deg C):	20.00	20.00	20.00	20.00	20.00
pH:	6.00	**6.20**	**9.00**	**6.00**	**9.00**
Alkalinity (mg CaCO3/L):	56.00	56.00	56.00	56.00	56.00
OUTPUT					
1. IONIZATION CONSTANTS					
Upstream/Background pKa:	6.40	6.40	6.40	6.40	6.40
Effluent pKa:	6.38	6.38	6.38	6.38	6.38
2. IONIZATION FRACTIONS					
Upstream/Background Ionization Fraction:	0.80	0.80	0.80	0.80	0.80
Effluent Ionization Fraction:	0.29	0.40	1.00	0.29	1.00
3. TOTAL INORGANIC CARBON					
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	32.16	32.16	32.16	32.16	32.16
Effluent Total Inorganic Carbon (mg CaCO3/L):	190.95	141.15	56.13	190.95	56.13
4. CONDITIONS AT MIXING ZONE BOUNDARY					
Temperature (deg C):	17.98	17.98	17.98	17.71	17.71
Alkalinity (mg CaCO3/L):	31.53	31.53	31.53	28.27	28.27
Total Inorganic Carbon (mg CaCO3/L):	62.70	53.12	36.77	45.62	34.19
pKa:	6.40	6.40	6.40	6.40	6.40
pH at Mixing Zone Boundary:	6.40	**6.56**	**7.18**	**6.61**	**7.08**

Water Quality Criteria, pH is 6.5 to 8.5 SU
A water quality-based limit is needed for the minimum pH during the wet season.

Table C-3: Streeter-Phelps Analysis of Critical DO Sag

Facility Name: **Duvall**

Streeter-Phelps analysis of critical dissolved oxygen sag.
Based on Lotus File DOSAG2.WK1 Revised 19-Oct-93

INPUT					Source
			Dry Season	Wet Season	
1. EFFLUENT CHARACTERISTICS			Aug-Oct	Nov-July	
Discharge (cfs):			2	8	Wastewater Treatment Plant Outfall Improvements, Parametrix, Inc., 4/00, App. A
CBOD5 (mg/L):			40	40	Technology-based limit weekly average
NBOD (mg/L):	0.38	mg/L NH3-N	1.74	1.74	Monthy avg. DMR data (64/14) conversion
Dissolved Oxygen (mg/L):			6.36	6.66	Wastewater Treatment Plant Outfall Improvements, Parametrix, Inc., 4/00, pg B-8
Temperature (deg C):			20	20	DMR data
2. RECEIVING WATER CHARACTERISTICS					
Upstream Discharge (cfs):			456	684	Wastewater Treatment Plant Outfall Improvements, Parametrix, Inc., 4/00, pg. 5-2
Upstream CBOD5 (mg/L):			1.4	1.4	Estimated, TMDL report background and tributary sources pg. 31
Upstream NBOD (mg/L):	0.01	mg/L NH3-N	0.05	0.05	Mixing Zone Study &TMDL Alt. Analysis, Parametrix, Inc., App. D
Upstream Dissolved Oxygen (mg/L):			9.38	10.35	Wastewater Treatment Plant Outfall Improvements, Parametrix, Inc., 4/00, pg B-8
Upstream Temperature (deg C):			20.1	15.2	Mixing Zone Study &TMDL Alt. Analysis, Parametrix, Inc., App. D
Elevation (ft NGVD):			150	150	Duvall webpage est. elevation
Downstream Average Channel Slope (ft/ft):			0.0009	0.0009	not applicable only used on Tsivoglou-Wallace model
Downstream Average Channel Depth (ft):			10	11.1	Wastewater Treatment Plant Outfall Improvements, Parametrix, Inc., 4/00, pg. 5-2
Downstream Average Channel Velocity (fps):			0.5	0.8	Wastewater Treatment Plant Outfall Improvements, Parametrix, Inc., 4/00, pg. 5-2
3. REAERATION RATE (Base e) AT 20 deg C (day^-1):			0.29	0.31	from below
Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values	Suggested Values	
Churchill	1.5 - 6	2 - 50	0.13	0.17	
O'Connor and Dobbins	.1 - 1.5	2 - 50	**0.29**	**0.31**	used based on low velocity and depth
Owens	.1 - 6	1 - 2	0.19	0.22	
Tsivoglou-Wallace	.1 - 6	.1 - 2	1.86	2.98	
4. BOD DECAY RATE (Base e) AT 20 deg C (day^-1):			0.51	0.42	use suggested value below
Reference			Suggested Value	Suggested Value	
Wright and McDonnell, 1979			0.51	0.42	
OUTPUT					
1. INITIAL MIXED RIVER CONDITION					
CBOD5 (mg/L):			1.6	1.8	
NBOD (mg/L):			0.1	0.1	
Dissolved Oxygen (mg/L):			9.4	10.3	
Temperature (deg C):			20.1	15.3	
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)					
Reaeration (day^-1):			0.29	0.28	
BOD Decay (day^-1):			0.51	0.34	
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU					
Initial Mixed CBODU (mg/L):			2.3	2.7	
Initial Mixed Total BODU (CBODU + NBOD, mg/L):			2.4	2.8	
4. INITIAL DISSOLVED OXYGEN DEFICIT					
Saturation Dissolved Oxygen (mg/L):			9.026	9.975	
Initial Deficit (mg/L):			-0.34	-0.33	
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):			2.84	3.61	
6. DISTANCE TO CRITICAL DO CONCENTRATION (miles):			23.26	47.30	
7. CRITICAL DO DEFICIT (mg/L):			0.97	0.99	
8. CRITICAL DO CONCENTRATION (mg/L):			**8.06**	**8.98**	

Table C-4: Simple Mixing Analysis
Using lowest dilution ratio

Temperature				
Discharge	18.8	C	65.84	
Receiving Water	17		62.6	
Dilution Ratio	5.2	:	1	
Temperature at edge of mixing zone	17.29			
Delta	0.290	=	0.3	WQS
WQS is max. of 18C or incremental increase of 0.3 above backgound				
Fecal Coliform				
Discharge	200			
Receiving Water	10			
Dilution Ratio	5.2	:	1	
Fecal at edge of mixing zone	40.6	=	100	WQS
WQS is 100 max. geometric mean.				

Table C-5: TMDL Allocation for 5-Plant Scenario

(The following table is an excerpt from the Department of Ecology's Snoqualmie River Total Maximum Daily Load Study, May 1994, p. 31.)

Waste Load Allocations used to calculate AML and MDL for $CBOD_5$ and Ammonia.

Table 8. Summary of estimated contaminant loads to the Snoqualmie River during critical low flow: August, September, and October (units of lbs/day).
Expansion to five municipal wastewater treatment plant (WWTP) to projected seasonal capacity and nonpoint sources are evaluated. Recommended controls are outlined.

PROJECTED WWTP EXPANSION WITH CONTROLS - NO NPS CONTROLS											WWTP AND NPS CONTROLS									
	Concentrations					Loads					Concentrations					Loads				
	Flow (cfs)	BOD5 (mg/L)	NH3-N (mg/L)	SRP (mg/L)	Fecal* Coliform	BOD5 (lbs/d)	NH3-N (lbs/d)	SRP (lbs/d)	Fecal* Coliform		Flow (cfs)	BOD5 (mg/L)	NH3-N (mg/L)	SRP (mg/L)	Fecal* Coliform	BOD5 (lbs/d)	NH3-N (lbs/d)	SRP (lbs/d)	Fecal* Coliform	
POINT SOURCES																				
North Bend	2.16	15	5	0.2	400	175	58.2	2	2.1E+10		2.16	15	9	0.22	400	175	104.8	3	2.1E+10	
Weyerhaeuser	0.01	4.7	0.08	0.03	6	0.25	0.004	0.002	1.5E+06		0.01	4.7	0.08	0.03	6	0.25	0.004	0.002	1.5E+06	
Snoqualmie	2.55	15	5	1.05	400	206	68.7	14	2.5E+10		2.55	15	9	1.05	400	206	123.7	14	2.5E+10	
Fall City	0.31	15	5	1.4	400	25	8.4	2	3.1E+09		0.31	15	9	2.5	400	25	15.0	4	3.1E+09	
Carnation	0.31	15	5	2	400	25	8.4	3	3.1E+09		0.31	15	9	2.5	400	25	15.0	4	3.1E+09	
Duvall	1.16	15	5	1.2	400	94	31.3	8	1.1E+10		1.16	15	8	2	400	94	50.0	13	1.1E+10	
Point Source Loads						**525**	**175**	**36**	**6.4E+10**							**525**	**309**	**38**	**6.4E+10**	
MAINSTEM NONPOINT SOURCES																				
Three forks area	0.02	60	1.5	1.4	3E+05	6	0.2	0.2	1.5E+11		0.02	60	1.5	1.4	3E+05	6	0.2	0.2	1.5E+11	
Below Fall City	0.1	60	15	1.4	3E+05	32	8.1	0.8	7.4E+11		0.075	60	15	1.4	3E+05	24	6.1	0.6	5.5E+11	
Below Patterson Cr.	0.1	60	15	1.4	3E+05	32	8.1	0.8	7.4E+11		0.07	60	15	1.4	3E+05	23	5.7	0.5	5.2E+11	
Novelty Hill Bridge	0.3	60	15	1.4	3E+05	97	24.3	2.3	2.2E+12		0.1	60	15	1.4	3E+05	32	8.1	0.8	7.4E+11	
Cherry Creek area	0.15	60	15	1.4	3E+05	49	12.1	1.1	1.1E+12		0.1	60	15	1.4	3E+05	32	8.1	0.8	7.4E+11	
High Bridge area	0.1	60	15	1.4	3E+05	32	8.1	0.8	7.4E+11		0.1	60	15	1.4	3E+05	32	8.1	0.8	7.4E+11	
Mainstem Nonpoint Loads						**240**	**61**	**6**	**5.7E+12**							**150**	**36**	**4**	**3.4E+12**	
BACKGROUND & TRIBUTARIES																				
S.F. Background	81	0.6	0.012	0.005	27	262	5.2	2.0	5.4E+10		81	0.6	0.012	0.0045	27	262	5.2	2.0	5.4E+10	
Middle Fork	187	0.6	0.011	0.002	21	605	11.1	2.0	9.7E+10		187	0.6	0.011	0.002	21	605	11.1	2.0	9.7E+10	
North Fork	73	0.6	0.011	0.002	21	236	4.3	0.8	3.8E+10		73	0.6	0.011	0.002	21	236	4.3	0.8	3.8E+10	
Kimball Cr.	0.95	1.4	0.018	0.008	1448	7	0.1	0.04	3.4E+10		0.95	1.4	0.018	0.008	80	7	0.1	0.04	1.9E+10	
Tokul Cr.	16.6	0.6	0.041	0.02	10	54	3.7	1.8	4.1E+09		16.6	0.6	0.041	0.02	10	54	3.7	1.8	4.1E+09	
Raging R.	8	1.4	0.015	0.005	31	60	0.6	0.2	6.1E+09		8	1.4	0.015	0.005	31	60	0.6	0.2	6.1E+09	
Patterson Cr.	7.4	2	0.03	0.05	207	80	1.2	2.0	3.8E+10		7.4	1.4	0.03	0.02	80	56	1.2	0.8	1.5E+10	
Griffin Cr.	1.75	1.4	0.031	0.008	238	13	0.3	0.1	1.0E+10		1.75	1.4	0.031	0.008	80	13	0.3	0.1	3.4E+09	
Tolt R.	66	0.6	0.014	0.002	15	213	5.0	0.7	2.4E+10		66	0.6	0.014	0.002	15	213	5.0	0.7	2.4E+10	
Harris Cr.	1.46	1.4	0.016	0.015	50	11	0.1	0.1	1.8E+09		1.46	1.4	0.02	0.015	50	11	0.2	0.1	1.8E+09	
Ames-Sikes Cr.	2.1	3	0.19	0.3	6550	34	2.2	3.4	3.4E+11		2.1	2	0.03	0.02	80	23	0.3	0.2	4.1E+09	
Tuck Cr.	0.34	1.4	0.051	0.067	74	3	0.1	0.1	6.2E+08		0.34	1.4	0.03	0.02	74	3	0.1	0.04	6.2E+08	
Cherry Cr.	5	1.4	0.041	0.013	530	38	1.1	0.4	6.5E+10		5	1.4	0.03	0.013	80	38	0.8	0.4	9.8E+09	
Tributary and Background Loads						**1616**	**35**	**14**	**7.1E+11**							**1586**	**33**	**9**	**2.6E+11**	
Total Loads						**2390**	**271**	**49**	**6.5E+12**							**2256**	**378**	**90**	**3.7E+12**	

Table C-6, Equivalent CBOD5 as calculated from DMR data

DATE	CBOD MG/L	CBOD LBS.	NH/3 MG/L	NH/3 LBS	Effective CBOD
06/02/05	2	9.52	0.1	0.4	10.6
06/03/05	2	11.01	0.1	0.3	11.8
06/09/05	2	8.54	0.3	1.2	11.6
06/10/05	3	13.19	0.1	0.6	14.7
06/16/05	2	7.92	0.7	2.9	15.1
06/17/05	2	8.26	0.2	0.8	10.2
06/23/05	3	13.46	0.2	0.8	15.4
07/01/05	**2**	**7.66**	**0.13**	**0.50**	**8.9**
07/07/05	**2**	**7.31**	**0.58**	**2.12**	**12.6**
07/08/05	**2**	**6.49**	**0.63**	**2.04**	**11.6**
07/14/05	**2**	**6.67**	**0.50**	**1.67**	**10.8**
07/15/05	**2**	**6.71**	**0.57**	**1.89**	**11.4**
07/22/05	**2**	**6.20**	**0.71**	**2.21**	**11.7**
07/23/05	**2**	**6.32**	**0.54**	**1.71**	**10.6**
07/28/05	**2**	**6.14**	**0.63**	**1.93**	**11.0**
07/29/05	**2**	**6.17**	**0.58**	**1.80**	**10.7**
08/04/05	**2**	**6.07**	**0.62**	**1.88**	**10.8**
08/05/05	**2**	**6.49**	**0.71**	**2.30**	**12.2**
08/11/05	**2**	**5.85**	**0.65**	**1.90**	**10.6**
08/12/05	**2**	**6.05**	**0.67**	**2.02**	**11.1**
08/18/05	**2**	**7.39**	**0.58**	**2.13**	**12.7**
08/30/05	**2**	**6.42**	**0.82**	**2.64**	**13.0**
08/31/05	**2**	**6.02**	**0.42**	**1.26**	**9.2**
09/28/05	**2**	**6.12**	**0.05**	**0.16**	**6.5**
09/29/05	**2**	**6.26**	**0.07**	**0.21**	**6.8**
10/06/05	2	6.59	0.13	0.44	7.7
10/07/05	2	6.72	0.82	2.70	13.5
10/14/05	2	6.42	0.06	0.19	6.9
10/20/05	2	7.06	0.08	0.27	7.7
10/21/05	2	6.74	0.11	0.37	7.7
10/27/05	3	10.48	0.10	0.34	11.3
10/28/05	2	6.74	0.13	0.45	7.9
11/03/05	2.4	13.90	0.02	0.08	14.1
11/04/05	<2.0	11.41	0.02	0.13	11.7
11/09/05	<2.0	10.02	0.01	0.07	10.2
11/10/05	2.9	13.20	0.01	0.06	13.4
11/17/05	<2.0	9.79	0.01	0.07	10.0
11/18/05	<2.0	9.14	0.01	0.07	9.3
11/23/05	<2.0	8.16	0.15	0.62	9.7
11/24/05	<2.0	7.89	0.01	0.06	8.0
12/01/05	<2.0	11.19	0.09	0.50	12.5
12/02/05	<2.0	10.58	0.05	0.26	11.2
12/08/05	<2.0	9.46	0.04	0.19	9.9
12/09/05	<2.0	8.99	0.04	0.18	9.4
12/15/05	<2.0	9.71	0.05	0.23	10.3
ALL DATA					
Count		65.0		65.0	45.0
Min		4.4		0.1	6.5
Max		15.8		2.9	15.4
Average	2.1	8.5	0.3	0.9	10.8
Std. Dev.	0.2	2.5	0.3	0.9	2.2
CV	0.115	**0.300**	1.047	**1.016**	**0.201**
LOW FLOW ONLY (July-Sept)					
Count					18.0
Min					6.5
Max					13.0
Average					10.7
Std. Dev.					1.8
CV					**0.166**

Table C-7, Calculation of AML for Equivalent CBOD5

Calculating Permit Limits Based on Wasteload Allocation
Source: EPA Technical Support Document for Water Quality-based Toxics Control

Input	Definition	Formula	Result	Units	Parameter
MDL	Maximum Daily Limit	=Daily WLA	**171.75**	lb/day	Equivalent CBOD
					from DMR data, from monthly average 7/1/05 through 9/30/05, low flow period after
CV	Coefficient of Variation	Calc. std. dev/mean	0.166		MBR start up
n	Number of samples	per month	8		
Variables					
σ	Standard Deviation	sqrt{ln(CV^2+1)}	0.165		
σ^2	Standard Deviation, squared	ln(CV^2+1)	0.027		
σ_n		ln(CV/n+1)	0.059		
σ^2_n		ln(CV^2/n+1)	0.003		
z (99th)	99th Percentile Occurrence		2.326		
z (95th)	95th Percentile Occurrence		1.645		
Output					
LTAc	Chronic Long-term average	MDL*exp($z_{99}\sigma$-0.5σ^2)	118.6	lb/day	CBOD
AML	Average Monthly Limit	LTAc*exp($z_{95}\sigma_n$-0.5σ_n^2)	**130.4**	lb/day	CBOD

APPENDIX D—DISCHARGE MONITORING REPORT DATA

Table D-1: Influent Data

Discharge Monitoring Data, March 10, 2000 to December 31, 2005

Facility: DUVALL STP
Permit No: WA0029513C

Influent

Date	BOD, 5-DAY (20 DEG. C)	BOD, 5-DAY (20 DEG. C)	BOD, 5-DAY (20 DEG. C)	BOD, 5-DAY (20 DEG. C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	SOLIDS, TOTAL SUSPENDED	SOLIDS, TOTAL SUSPENDED	SOLIDS, TOTAL SUSPENDED	SOLIDS, TOTAL SUSPENDED
	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
	MG/L	MG/L	LBS/DAY	LBS/DAY	MG/L	MG/L	LBS/DAY	LBS/DAY	MG/L	MG/L	LBS/DAY	LBS/DAY
1-Apr-00	189	237	559	663	171	216	507	604	149	190	495	
1-May-00	211	248	629	678	173	209	516	602	137	173	431	
1-Jun-00	237	277	672	736	203	266	585	691	160	188	480	
1-Jul-00	263	315	639	808	213	275	559	706	180	193	490	
1-Aug-00	266	299	672	743	229	286	565	706	224	278	586	684
1-Sep-00	272	315	689	776	229	288	579	708	185	244	497	755
1-Oct-00	257	314	738	969	225	294	648	942	192	277	639	1,115
1-Nov-00	279	377	955	1,647	213	318	717	1,180	192	260	706	1,157
1-Dec-00	268	331	1,076	1,522	232	298	924	1,297	184	255	788	1,181
1-Jan-01	225	269	928	1,153	194	241	803	1,077	162	271	736	1,161
1-Feb-01	183	207	724	767	166	191	659	791	669	931	144	214
1-Mar-01	281	401	1,044	1,471	202	341	754	1,251	174	221	722	1,146
1-Apr-01	146	204	558	648	136	201	497	645	160	218	652	838
1-May-01	200	207	661	760	186	252	597	793	172	209	604	876
1-Jun-01	240	256	759	862	199	236	629	845	199	239	665	838
1-Jul-01	293	440	678	973	254	403	580	891	584	759	208	276
1-Aug-01	268	421	633	979	223	294	557	861	209	275	523	741
1-Sep-01	305	450	671	933	257	405	591	840	204	280	535	882
1-Oct-01	241	285	678	914	213	307	584	898	209	253	614	1,038
1-Nov-01	175	232	766	1,100	175	231	788	1,383	254	490	**1,146**	1,961
1-Dec-01	165	211	825	974	162	277	799	1,154	172	233	850	1,156
1-Jan-02	172	248	790	1,130	161	231	789	1,029	159	274	825	1,290
1-Feb-02	186	209	793	1,022	146	177	606	865	130	213	602	876
1-Mar-02	216	321	908	1,522	178	299	750	1,418	155	272	676	1,290
1-Apr-02	197	248	768	930	146	201	572	754	125	164	497	701
1-May-02	215	242	829	1,360	197	319	754	1,366	158	262	613	1,360
1-Jun-02	203	310	759	844	225	285	673	841	136	156	407	492
1-Jul-02	254	280	847	987	210	275	684	1,009	156	187	492	715
1-Aug-02	283	300	652	780	237	274	555	723	164	203	384	542
1-Sep-02	236	276	598	681	205	252	512	624	156	183	389	476
1-Oct-02	257	300	693	846	237	260	618	846	163	221	426	644
1-Nov-02	267	301	821	1,037	256	332	880	1,843	210	374	709	1,104
1-Dec-02	283	384	903	1,223	260	377	840	1,117	196	279	644	948
1-Jan-03	202	237	801	1,020	183	250	714	901	184	439	790	2,145
1-Feb-03	222	235	731	869	191	224	640	820	170	233	564	766
1-Mar-03	235	296	844	990	197	269	720	852	159	221	580	756
1-Apr-03	187	262	663	919	175	261	631	915	155	243	562	852
1-May-03	193	223	610	748	156	221	467	671	193	224	564	726
1-Jun-03	290	310	683	721	262	297	604	739	235	265	557	623
1-Jul-03	276	300	621	698	252	301	561	689	228	282	508	649
1-Aug-03	318	350	702	771	246	311	544	685	245	293	542	645
1-Sep-03	264	277	606	650	236	332	541	711	229	269	527	580
1-Oct-03	238	332	696	861	215	309	605	822	203	325	580	849
1-Nov-03	217	344	687	881	193	299	734	1,144	796	2,057	237	858
1-Dec-03	229	270	921	1,104	189	251	762	915	145	165	584	638
1-Jan-04	185	197	879	1,034	169	265	959	2,713	150	233	838	2,232
1-Feb-04	317	635	1,208	2,041	286	588	1,143	1,936	198	380	766	1,251
1-Mar-04	257	319	965	1,555	218	287	815	1,086	165	221	607	781
1-Apr-04	263	315	689	826	218	317	549	822	200	319	564	827
1-May-04	378	509	1,009	1,485	281	411	747	1,199	286	445	748	1,298
1-Jun-04	366	455	973	1,210	277	358	722	952	345	561	920	1,539
1-Jul-04	303	413	750	990	337	230	578	781	277	386	767	1,144
1-Aug-04	276	365	853	1,072	254	339	794	1,012	254	298	798	999
1-Sep-04	285	424	799	1,102	235	366	675	951	325	605	934	1,572
1-Oct-04	267	315	656	690	225	300	554	614	204	321	502	640
1-Nov-04	239	329	910	1,053	234	380	857	1,378	229	351	890	1,520
1-Dec-04	289	732	1,267	3,032	203	431	887	1,786	157	205	692	872
1-Jan-05	237	248	932	1067	222	395	889	1389	192	274	769	963
1-Feb-05	238	279	863	998	202	251	718	898	250	392	897	1375
1-Mar-05	246	319	973	1179	241	281	775	979	226	276	706	979
1-Apr-05	324	553	1181	2063	225	469	846	1750	301	701	1118	2649
1-May-05	209	305	947	1042	189	260	675	947	178	349	670	1044
1-Jun-05	206	241	906	1081	183	238	825	1068	163	202	743	953
1-Jul-05	277	410	898	1139	253	376	788	1220	247	325	858	1390
1-Aug-04	276	365	853	1072	254	339	794	1012	254	298	798	999
1-Sep-04	285	424	799	1102	235	366	675	951	325	605	934	1572
1-Oct-04	267	315	656	690	225	300	554	614	204	321	502	640
1-Nov-05	270	343	1285.98	1985	217.2	278	1043.89	1597	226.4	464	1051.38	2241
1-Dec-05	192.5	224	1069.64	1388.35	180.6	258.5	1038.43	1727.05	202.2	488	1038.9	2186
AVE:	247	322	809	1,066	214	297	697	1,022	220	337	650	1,049
MIN:	146	197	558	648	136	177	467	602	125	156	144	214
MAX:	378	732	1,286	3,032	337	588	1,143	2,713	796	2,057	1,146	2,649
LIMIT:	na	na	1,363	na	na	na	na	na	na	na	1,139	na
Aug-Oct	na	na	na	na	na	na	na	na	na	na	na	na
Inact 4/10/02			765								1,020	
DESIGN:			1,604								1,340	

exceeds permit limits

Table D-2: Effluent Data

Facility: DUVALL STP
Permit No: WA0029513C

Effluent

Date	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, 5-DAY (20 DEG C)	BOD, CARBONACEOUS, % REMOVAL	SOLIDS, TOTAL SUSPENDED	SOLIDS, TOTAL SUSPENDED	SOLIDS, TOTAL SUSPENDED	SOLIDS, TOTAL SUSPENDED	SOLIDS, SUSPENDED, % REMOVAL	PH	PH	COLIFORM, FECAL	COLIFORM, FECAL
	AVG	MAX	AVG	AVW	AVG	AVW	AVG	AVG	AVW	AVG	AVW	AVG	MAX	MIN	GEM	GM7
	MGD	MGD	MG/L	MG/L	LBS/DAY	LBS/DAY	PERCENT	MG/L	MG/L	LBS/DAY	LBS/DAY	PERCENT	S.U.	S.U.	#/100 ML	#/100 ML
1-Apr-00	0.391	0.505	4.0	6.0	13	15	97	11	13	39	44	92	7	6	16	28
1-May-00	0.371	0.473	4.0	5.0	11	14	98	9	11	30	38	93	7	6	15	55
1-Jun-00	0.362	0.450	3.0	4.0	9	11	98	8	13	24	39	95	7	6	2	1
1-Jul-00	0.313	0.355			8	9	98	3	3	19	33	96	7	6	4	12
1-Aug-00	0.300	0.338	2.0	3.0	6	7		8	12	20	32	97	7	6	4	28
1-Sep-00	0.317	0.405	3.0	4.0	8	9		8	14	22	40	96	7	6	5	9
1-Oct-00	0.378	0.551	3.0	4.0	10	11		12	14	38	45	94	7	6	4	18
1-Nov-00	0.420	0.737	4.0	6.0	14	20	98	10	14	39	67	94	7	6	6	8
1-Dec-00	0.489	0.585	4.0	7.0	16	29	98	10	12	42	55	95	7	6	9	16
1-Jan-01	0.525	0.689	6.0	8.0	25	28	97	12	18	52	78	93	7	6	8	39
1-Feb-01	0.516	0.647	5.0	5.0	19	21	97	13	15	54	63	92	7	6	3	6
1-Mar-01	0.483	0.628	6.0	9.0	23	31	97	15	22	63	84	91	7	6	3	5
1-Apr-01	0.460	0.889	6.0	16.0	23	35	96	18	24	80	94	89	7	6	13	49
1-May-01	0.385	0.559	5.0	6.0	16	17	97	10	14	36	46	98	7	6	4	20
1-Jun-01	0.381	0.504	5.0	7.0	16	28	97	16	26	56	99	92	7	6	30	85
1-Jul-01	0.297	0.355	6.0	8.0	15	19	98	23	35	58	93	90	7	6	13	68
1-Aug-01	0.281	0.389	4.0	5.0	10	11		15	22	41	54	92	7	6	3	9
1-Sep-01	0.295	0.413	4.0	6.0	9	13		11	17	29	45	95	7	6	5	6
1-Oct-01	0.348	0.588	6.0	8.0	15	19		16	21	46	60	92	7	6	13	54
1-Nov-01	0.608	1.145	3.0	4.0	16	19	98	12	16	58	83	95	7	6	7	21
1-Dec-01	0.625	1.025	4.0	9.0	19	28	98	11	13	55	73	94	7	6	6	30
1-Jan-02	0.670	0.928	3.0	4.0	14	20	98	17	20	95	105	89	7	6	6	38
1-Feb-02	0.562	0.767	5.0	7.0	19	29	97	14	18	64	97	89	7	6	1	2
1-Mar-02	0.503	0.611	3.0	5.0	13	22	98	8	11	29	44	95	7	6	2	6
1-Apr-02	0.474	0.678	3.0	4.0	11	14	98	5	7	22	33	96	7	6	2	3
1-May-02	0.423	0.677	5.0	6.0	18	22	97	12	16	41	54	92	7	6	16	102
1-Jun-02	0.372	0.478	5.0	6.0	16	19	98	7	9	21	26	95	7	6	24	81
1-Jul-02	0.352	0.519	3.0	4.0	10	15	99	9	22	27	28	94	7	6	4	27
1-Aug-02	0.283	0.382	5.0	7.0	13	19		13	24	31	67	92	7	6	19	50
1-Sep-02	0.314	0.390	3.0	4.0	9	12		7	9	17	24	96	7	6	3	4
1-Oct-02	0.332	0.540	3.0	5.0	8	25		4	7	11	17	98	7	6	8	44
1-Nov-02	0.386	0.676	4.0	6.0	14	21	98	8	11	30	53	96	7	6	68	89
1-Dec-02	0.425	0.694	3.0	4.0	11	14	99	8	13	26	49	96	7	6	68	89
1-Jan-03	0.506	0.686	5.0	7.0	22	30	98	7	11	31	50	96	7	6	17	90
1-Feb-03	0.428	0.580	3.0	5.0	11	15	98	5	10	16	32	97	7	6	4	8
1-Mar-03	0.463	0.746	6.0	8.0	20	27	97	6	8	21	36	96	7	6	26	53
1-Apr-03	0.447	0.544	4.0	5.0	16	19	98	6	10	23	35	96	7	6	8	33
1-May-03	0.350	0.475	3.0	6.0	9	16	98	7	11	21	27	96	7	6	18	53
1-Jun-03	0.295	0.332	4.0	5.0	9	12	98	5	7	11	17	98	7	6	4	8
1-Jul-03	0.270	0.312	6.0	8.0	14	18	98	9	12	20	26	96	7	6	3	4
1-Aug-03	0.266	0.312	4.0	6.0	9	16		7	12	15	25	97	7	6	3	33
1-Sep-03	0.283	0.336	4.0	5.0	9	18		10	14	24	30	96	7	6	26	45
1-Oct-03	0.354	0.801	5.0	7.0	16	34		9	10	25	33	96	7	6	14	77
1-Nov-03	0.449	1.031	4.0	6.0	21	55	98	6	9	29	71	98	7	6	2	8
1-Dec-03	0.449	1.031	4.0	6.0	21	55	98	6	9	29	71	98	7	6	2	8
1-Jan-04	0.598	1.227	12.0	15.0	64	100	93	16	19	90	160	89	7	6	52	97
1-Feb-04	0.533	0.919	6.0	8.0	25	31	98	5	8	22	42	97	7	6	11	121
1-Mar-04	0.455	0.600	5.0	6.0	21	27	98	8	9	28	49	95	7	6	22	60
1-Apr-04	0.345	0.594	6.0	10.0	16	37	97	16	21	43	59	92	7	6	54	85
1-May-04	0.323	0.448	4.0	7.0	12	19	99	11	17	28	42	96	7	6	60	93
1-Jun-04	0.323	0.444	4.0	5.0	10	14	99	8	11	21	25	98	7	6	22	57
1-Jul-04	0.311	0.398	5.0	6.0	13	17	98	9	15	23	45	98	7	6	55	75
1-Aug-04	0.378	0.472	6.0	10.0	17	40		6	10	18	31	98	7	6	58	93
1-Sep-04	0.392	0.814	5.0	7.0	15	31		10	14	29	43	97	7	6	30	76
1-Oct-04	0.343	0.596	6.0	15.0	15	36		12	35	30	75	94	7	6	61	78
1-Nov-04	0.463	0.712	5.0	7.0	19	25	98	4	7	17	24	98	7	6	2	9
1-Dec-04	0.562	0.986	4.0	7.0	17	29	98	7	10	32	45	96	7	6	3	8
1-Jan-05	0.505	0.74	5.0	9.0	22	42	98	6	13	24	48	97	7	7	2	3
1-Feb-05	0.452	0.572	4.0	5.0	19	31	98	5	7	17	25	98	7	7	0	0
1-Mar-05	0.455	1.135	4.0	7.0	13	23	98	6	10	19	30	97	7.1	6.4	5	9
1-Apr-05	0.504	0.943	4.0	5.0	14	17	98	9	12	34	43	97	6.8	6.2	54	85
1-May-05	0.471	0.764	5.0	9.0	14	29	97	4	9	15	30	98	7.17	6.2	3	16
1-Jun-05	0.518	0.66	3.0	5.0	10	13	100.0	0.4	0.4	2.0	2.0	98.0	7.3	6.6	0	0
1-Jul-05	0.412	0.485	2.0	2.0	7	8	99.0	0.4	0.4	1.0	2.0	100.0	7.1	6.6	0	0
1-Aug-05	0.368	0.443	2.0	2.0	6	7		0.4	0.4	1.0	31.0	100.0	7.0	6.6	0	0
1-Sep-05	0.414	0.523	2.0	2.0	7	7		1.0	1.0	2.0	4.0	100.0	6.9	6.6	0	0
1-Oct-05	0.428	0.546	2.0	3.0	7	14		0.8	1.2	3.0	4.0	99.0	7.0	6.4	0	0
1-Nov-05	0.621	0.888	2.2	2.5	10	13	99.0	0.5	0.6	2.3	2.1	100.0	7.3	6.6	0	0
1-Dec-05	0.679	1.114	2.0	2.1	11	15	98.9	0.4	0.6	2.2	3.3	99.8	7.1	6.5	0	0
AVE:	0.421	0.634	4.25	6.21	14.77	22.7	97.8	8.58	12.62	30.19	46.08	95	7.01	6.10	14.71	36.04
MIN:	0.266	0.312	2.00	2.00	6.00	7.0	93.0	0.36	0.40	1.00	2.00	89	6.80	6.00	0.00	0.00
MAX:	0.679	1.227	12.00	16.00	64.00	100.0	100.0	23.00	35.00	95.00	160.00	100	7.30	7.00	68.00	121.00
LIMIT:	0.765	na	25	40	188	300	75	30	45	225	338	81	9.0	6.0	200	400
Aug-Oct	0.638	na	18.3	27.5	114	172.0	None	30	45	188	281	81	9.0	6.0	200	400
Inact DESIGN:	0.90															

exceeds permit limits

Table D-3: Effluent Data (con.'t)

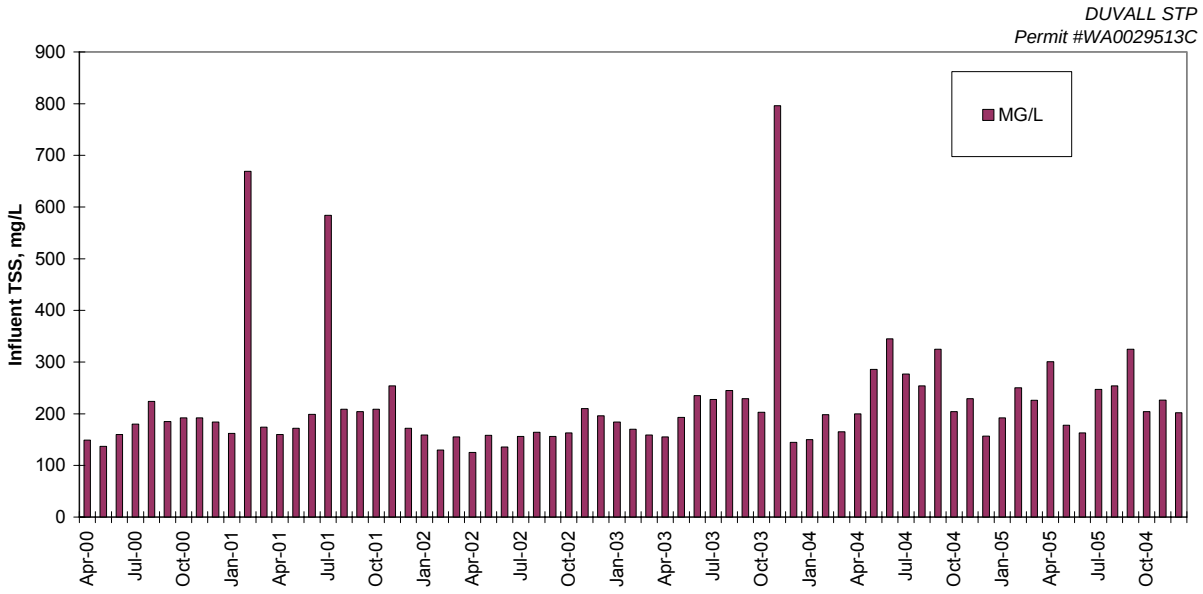
Facility: DUVALL STP
Permit No: WA0029513C

Effluent - Ammonia and Metals

Date	NITROGEN, AMMONIA TOTAL (AS N)	NITROGEN, AMMONIA TOTAL (AS N)	NITROGEN, AMMONIA TOTAL (AS N)	NITROGEN, AMMONIA TOTAL (AS N)	COPPER, TOTAL RECOVERABLE	COPPER, TOTAL RECOVERABLE	COPPER, TOTAL RECOVERABLE	MERCURY, TOTAL RECOVERABLE	MERCURY, TOTAL RECOVERABLE	MERCURY, TOTAL RECOVERABLE	SILVER, TOTAL RECOVERABLE	SILVER, TOTAL RECOVERABLE	ZINC, TOTAL RECOVERABLE	ZINC, TOTAL RECOVERABLE	ZINC, TOTAL RECOVERABLE
	AVG	AVG	MAX	MAX	AVG	AVG	MAX	AVG	AVG	MAX	AVG	AVG	MAX	AVG	AVG	MAX
	LBS/DAY	MG/L	LBS/DAY	MG/L	LBS/DAY	UG/L	UG/L	LBS/DAY	UG/L	UG/L	LBS/DA	UG/L	UG/L	LBS/DA	UG/L	UG/L
1-Apr-00	0.78	0.26	0.98	0.31	**0.06**	**17**	**19**	0	0	0	0	0.1	0.4	0.12	33	42
1-May-00	0.8	0.27	0.92	0.31	**0.047**	**14**	**18**	0	0	0	0.001	0.35	0.7	0.143	**42**	47
1-Jun-00	1.21	0.41	1.47	0.51	0.03	**10**	**14**	0	0	0	0.001	0.24	0.4	0.126	36	61
1-Jul-00	0.93	0.36	1.22	0.46	**0.05**	**18**	**20**	0	0	0	0	0.18	0.4	0.146	**53**	66
1-Aug-00	0.78		0.92		**0.4**	**15**	**20**	0	0	0	0.001	**0.5**	0.7	0.153	**56**	69
1-Sep-00	1.08		1.14		**0.04**	**13**	**14**	0	0	0	0	0.1	0.4	0.158	**51**	63
1-Oct-00	1.19		1.33		**0.036**	**10**	**15**	0	0	0	0.002	0.1	0.3	0.14	**40**	44
1-Nov-00	1.24	0.37	1.47	0.45	0.04	**12**	**15**	0	0	0	0	0	0	0.143	39	44
1-Dec-00	1.35	0.35	1.5	0.38	0.04	**9**	**13**	0	0	0	0	0.06	0.3	0.114	25	41
1-Jan-01	1.46	0.35	1.66	0.36	**0.09**	**18**	**50**	0	0	0	0	0	0	0.278	**110**	58
1-Feb-01	1.22	0.31	1.41	0.35	**0.06**	**14**	**15**	0	0	0	0	0.05	0.2	0.237	**52**	73
1-Mar-01	1.39	0.36	1.75	0.41	**0.07**	**18**	**21**	0	0	0	0	0.1	0.4	0.036	9	20
1-Apr-01	1.4	0.41	2	0.63	**0.05**	**12**	**18**	0	0	0	0	0	0	0.125	29.8	40
1-May-01	0.8	0.27	1.5	0.41	**0.05**	**14.8**	**19**	0.001	**0.2**	**0.6**	0	0	0	0.125	36.8	43
1-Jun-01	1	0.32	1.1	0.37	**0.05**	**13.3**	**20**	0	0	0	**0.008**	**2.5**	**10**	0.148	**42.3**	48
1-Jul-01	0.5	0.23	0.6	0.28	**0.08**	**28**	**38**	0	0	0	0	0.1	0.4	0.087	32.3	55
1-Aug-01	0.6		1.1		**0.05**	**19.3**	**23**	0	0.1	**0.3**	0.001	0.3	0.5	0.107	**43**	62
1-Sep-01	0.5		0.6		**0.05**	**19**	**20**	0	0	0	0	0	0	0.177	**61.5**	**72**
1-Oct-01	0.4		0.5		**0.06**	**21.8**	**28**	0	0	0	0	0	0	0.132	**44.8**	66
1-Nov-01	0.8	0.26	1.9	0.6	0.04	**8.6**	**12**	0	0	0	0	0	0	0.149	33.6	45
1-Dec-01	0.5	0.12	1.2	0.31	0.04	**7.5**	**12**	0	0	0	0	0	0	0.155	29.3	31
1-Jan-02	0.4	0.07	0.6	0.11	**0.06**	**9.8**	**13**	0	0	0	0	0	0	0.193	33.5	41
1-Feb-02	0.9	0.25	2	0.69	0.03	**6**	**13**	0	0	0	0	0	0.2	0.172	35.2	52
1-Mar-02	0.7	0.2	2.2	0.72	**0.06**	**13.5**	**23**	0	0	0	0	0	0	0.145	33.5	52
1-Apr-02	0.7	0.18	1.4	0.4	**0.07**	**15.5**	**18**	0	0	0	0	0	0	0.122	31	36
1-May-02	1.2	0.34	2.6	0.78												
1-Jun-02	1.9	0.63	3.8	1.2												
1-Jul-02	1.7	0.5	2.8	0.77												
1-Aug-02	0.4	0.17														
1-Sep-02	0.4	0.15														
1-Oct-02	1.8	0.69														
1-Nov-02	3.1	1.02	4.8	1.93												
1-Dec-02	1.1	0.34	2.5	0.77												
1-Jan-03	2.1	0.5	5.3	1.21												
1-Feb-03	1.9	0.58	4.4	1.32												
1-Mar-03	0.51	1.9	1.1	3.8												
1-Apr-03	1.8	0.49	6.1	1.58												
1-May-03	1	0.4	3.2	1.27												
1-Jun-03	0.5	0.22	0.8	0.35												
1-Jul-03	0.6	0.28	1.8	0.82												
1-Aug-03	0.7	0.34														
1-Sep-03	1.1	0.46														
1-Oct-03	0.5	0.19														
1-Nov-03	0.8	0.19	1.8	0.31												
1-Dec-03	0.8	0.2	1.2	0.32												
1-Jan-04	6	1.37	13.5	2.98												
1-Feb-04	12.5	2.75	28.1	4.94												
1-Mar-04	1.2	0.3	3.7	0.81												
1-Apr-04	0.5	0.18	0.9	0.31												
1-May-04	0.6	0.23	3.6	1.2												
1-Jun-04	0.2	0.09	0.5	0.18												
1-Jul-04	0.4	0.17	0.9	0.4												
1-Aug-04	0.5	0.17														
1-Sep-04	1.2	0.43														
1-Oct-04	0.2	0.07														
1-Nov-04	0.3	0.07	0.4	0.12												
1-Dec-04	0.3	0.05	0.6	0.13												
1-Jan-05	0.3	0.07	0.5	0.14												
1-Feb-05	0.4	0.12	0.6	0.18												
1-Mar-05	0.6	0.19	0.8	0.25												
1-Apr-05	2.4	0.46	8.2	1.3												
1-May-05	0.9	0.23	1.2	0.36												
1-Jun-05	0.8	0.2	2.9	0.72												
1-Jul-05	1.8	0.54	2.2	0.71												
1-Aug-05	2	0.65														
1-Sep-05	0.7	0.2														
1-Oct-05	0.7	0.18														
1-Nov-05	0.1	0.03	0.6	0.15												
1-Dec-05	0.4	0.08	1.9	0.45												
AVE:	1.18	0.38	2.56	0.78	0.07	14.28	19.64	0.00	0.01	0.04	0.00	0.19	0.61	0.15	41.30	50.84
MIN:	0.10	0.03	0.40	0.11	0.03	6.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	9.00	20.00
MAX:	12.50	2.75	28.10	4.94	0.40	28.00	50.00	0.00	0.20	0.60	0.01	2.50	10.00	0.28	110.00	73.00
LIMIT:	38	5	60	8	0.040	5.3	10.6	0.001	0.1	0.3	0.003	0.4	0.9	0.306	40.7	81.7
Aug-Oct	10	1.6	na	na	0.029	4.6	9.3	0.001	0.1	0.2	0.002	0.4	0.8	0.221	35.4	71.0
Inact 4/10/02	7.5	1.2	12.5		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
DESIGN:																

exceeds permit limits

Table D-4: Influent TSS and BOD_5 Graph
Discharge Monitoring Data, Influent TSS and BOD, March 10, 2000 to December 31, 2005



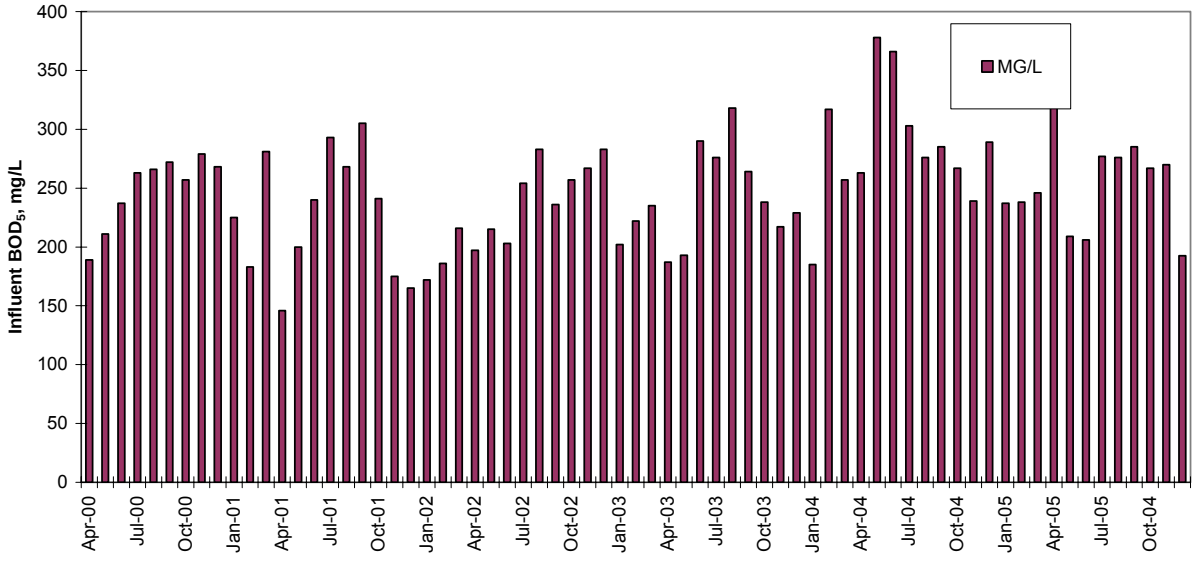
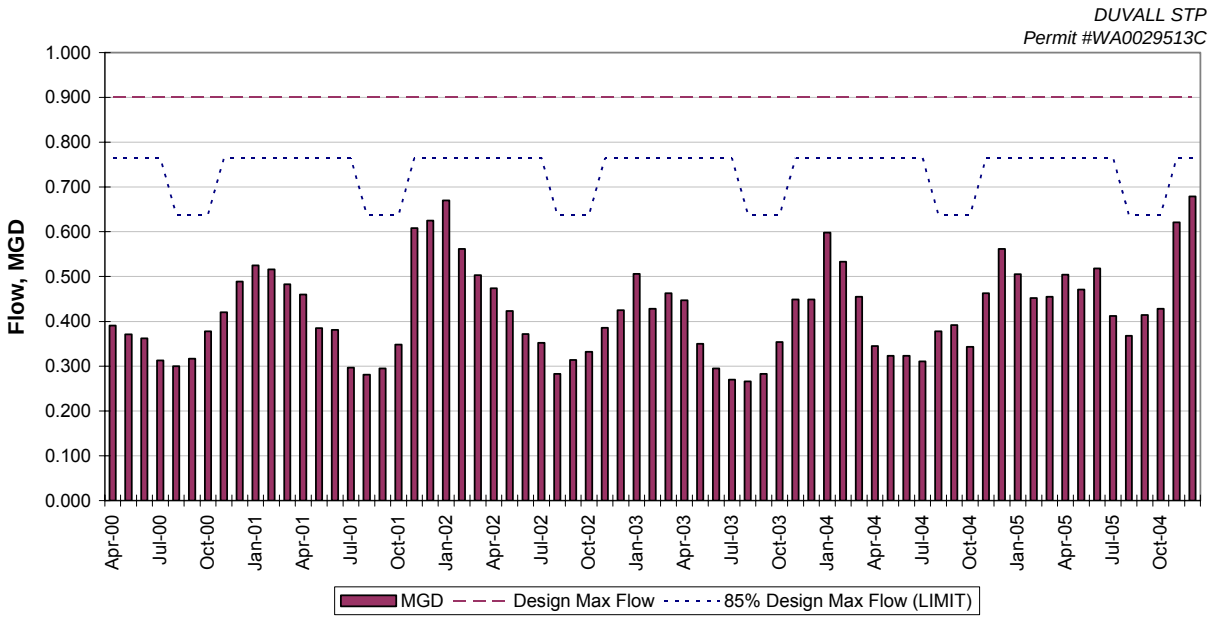


Table D-5: Influent Flow and Effluent pH Graph
Discharge Monitoring Data, Flow and pH, March 10, 2000 to December 31, 2005



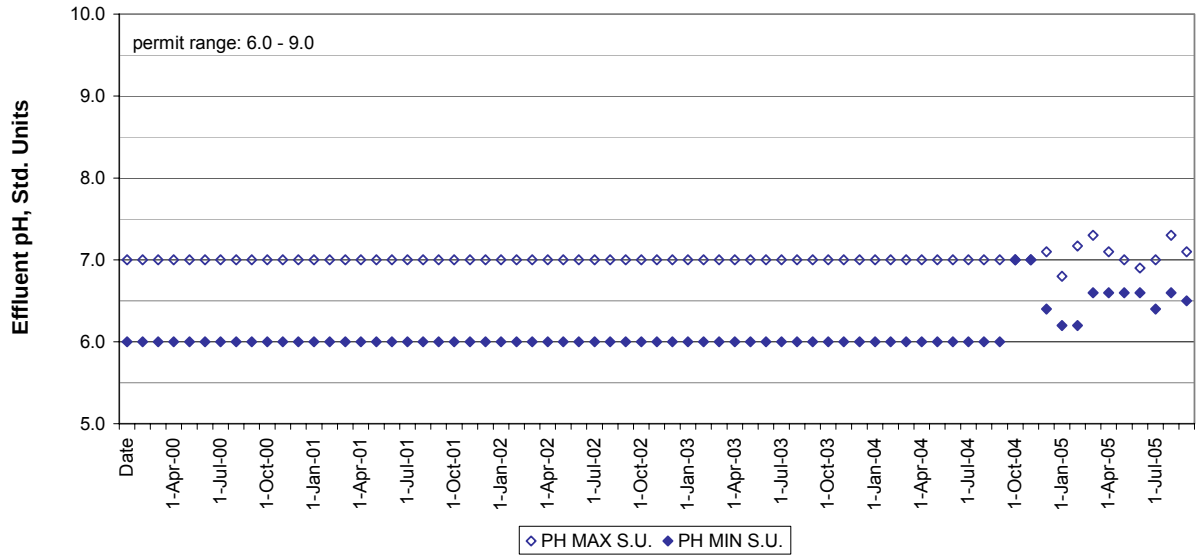


Table D-6: Effluent Fecal Coliform Graph

Discharge Monitoring Data, Effluent Fecal Coliform, March 10, 2000 to December 31, 2005

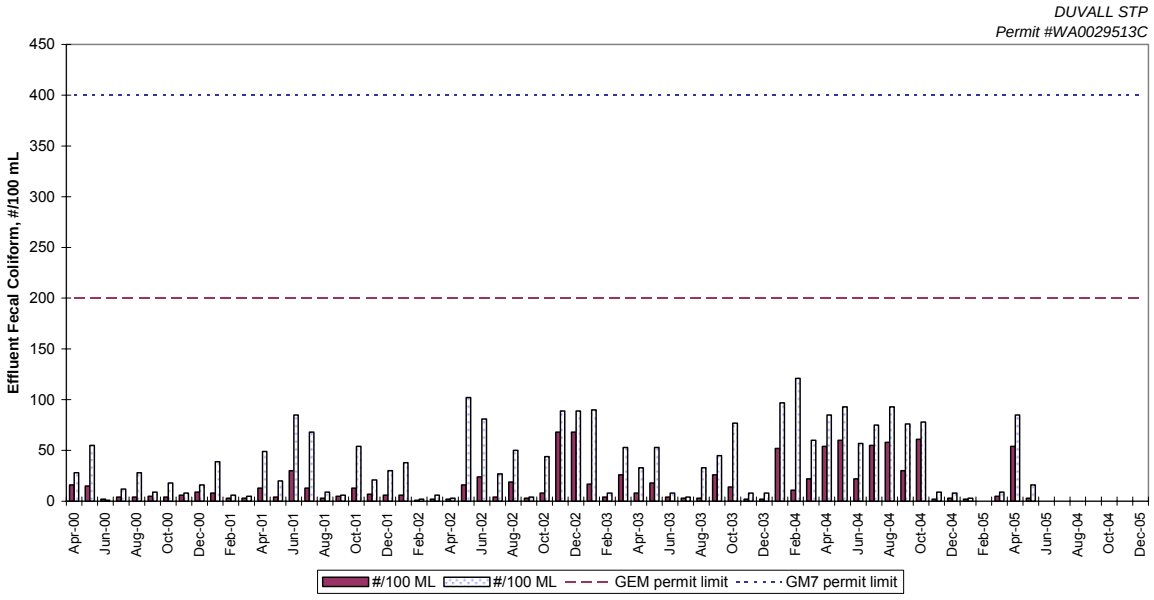
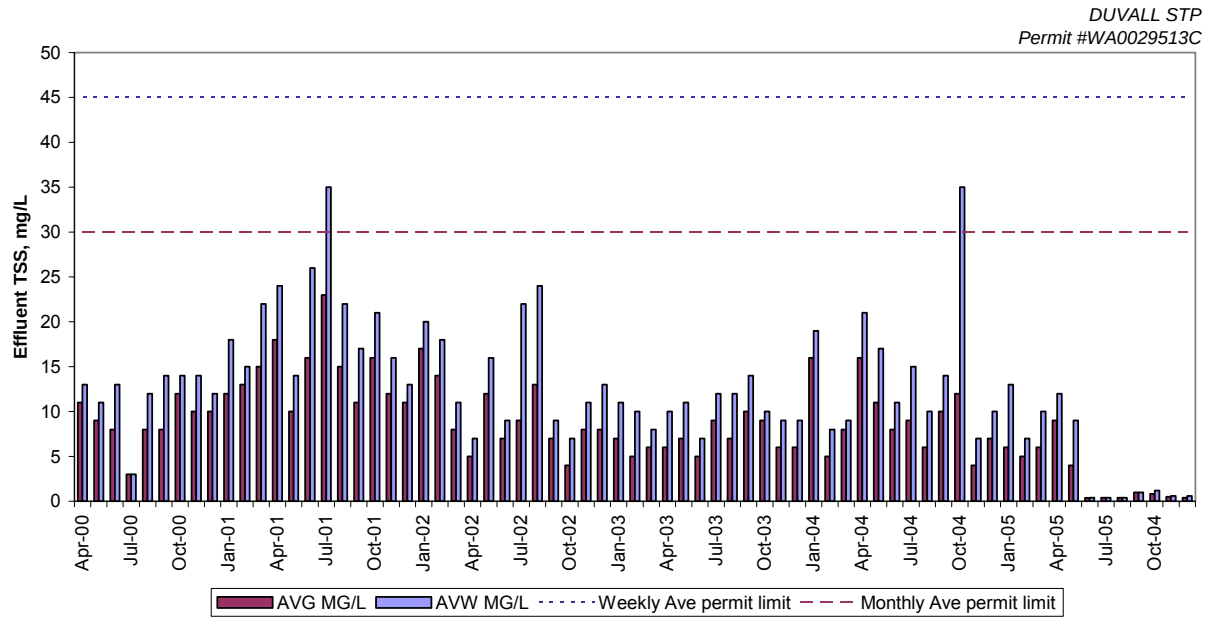


Table D-7: Effluent TSS Graph
Discharge Monitoring Data, Effluent TSS, March 10, 2000 to December 31, 2005



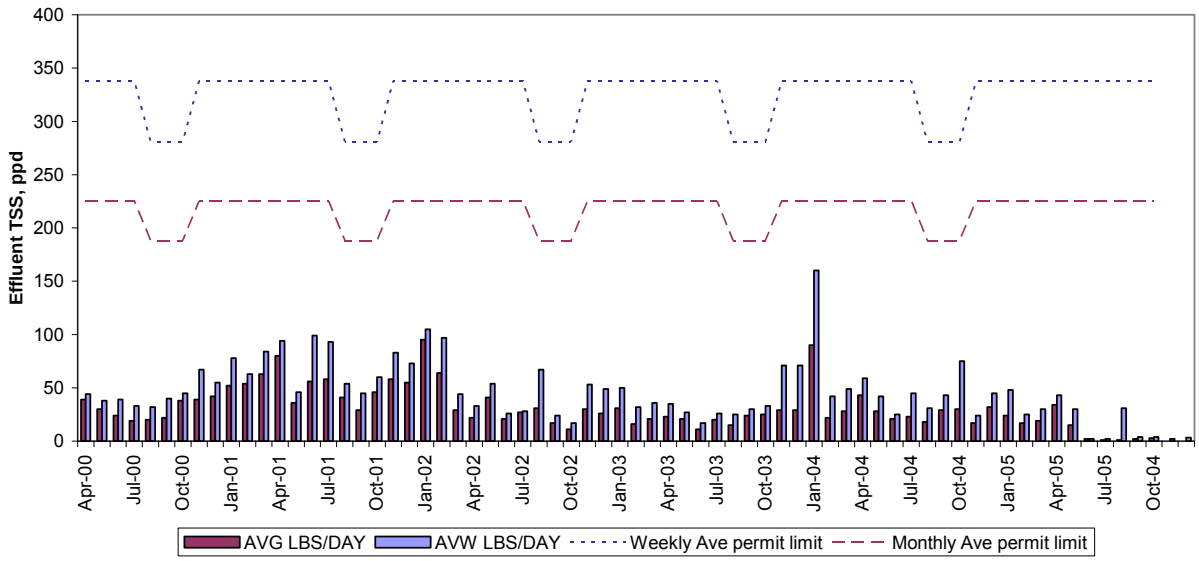
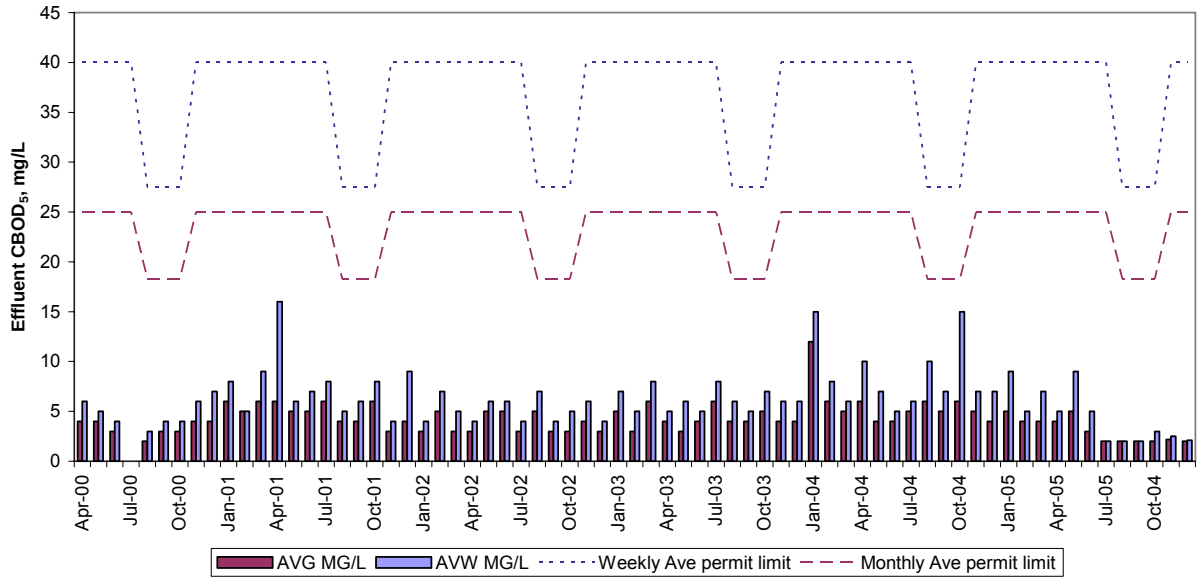


Table D-8: Effluent CBOD Graph

Discharge Monitoring Data, Effluent CBOD5, March 10, 2000 to December 31, 2005

DUVALL STP
Permit #WA0029513C



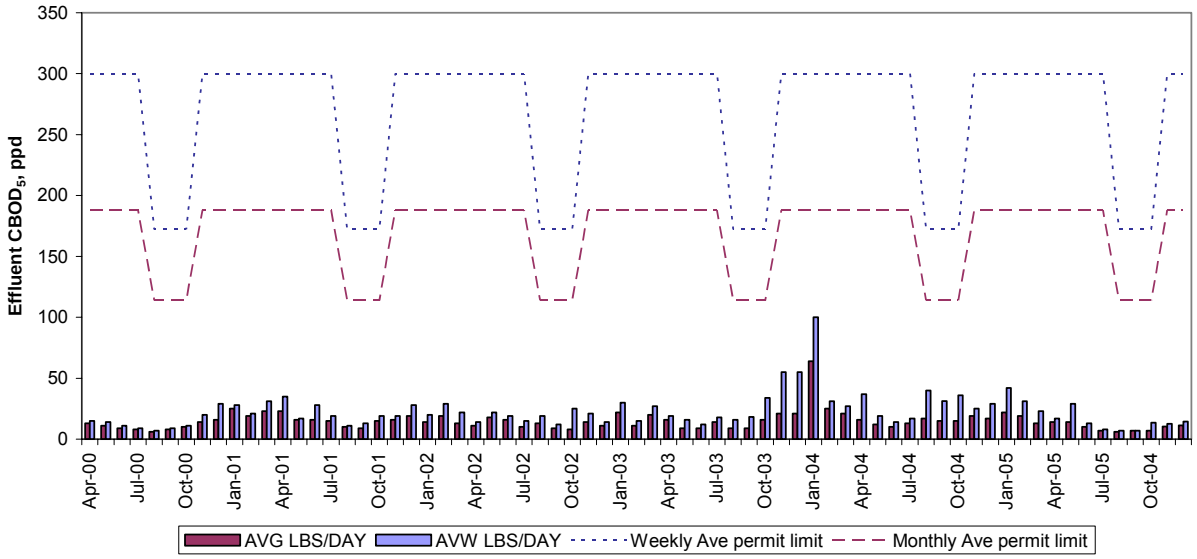
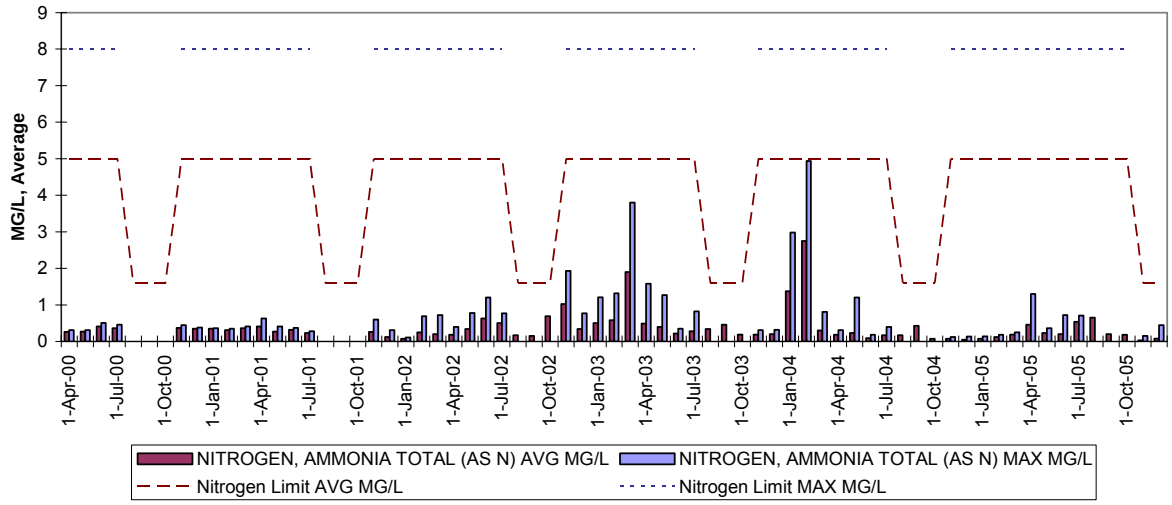


Table D-9: Effluent Nitrogen, Ammonia Graph

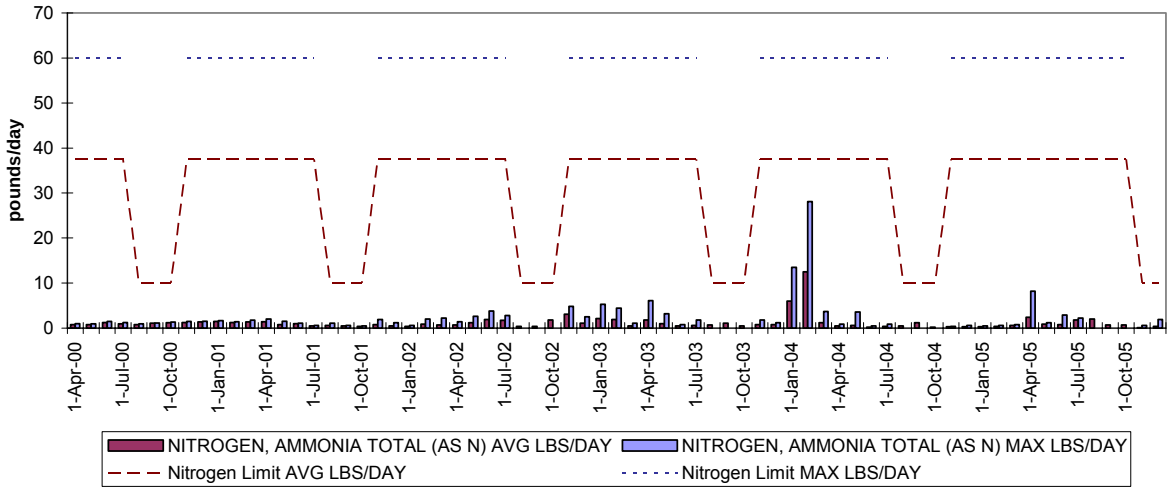
Discharge Monitoring Data, Effluent Nitorgen, Ammonia, March 10, 2000 to December 31, 2005

DUVALL STP
Permit #WA0029513C

Nitrogen, Ammonia (total as N) Concentration



Nitrogen, Ammonia (total as N) Mass



APPENDIX E—RESPONSE TO COMMENTS

Comments City of Duvall:
Received from Steve Schuller, Director of Public Works, via email on May 25, 2006.

Thank you for allowing us the opportunity to review the draft NPDES permit for the Duvall WWTP. Below is out list of comments for the draft permit.

NPDES Permit
Section S1. Effluent Limitations Low River Flow Period
1- Duvall's new treatment plant was designed based on the 203.5 lbs/day CBOD + ammonia limit included in the NPDES permit and approved Facility Plan. This draft permit has proposed reducing these TMDL limits to 171.8 lbs/day. The fact sheet indicates that the reason for the reduction is to give some of the TMDL allocation to Carnation and Fall City. We do not feel it is fair to reduce the permit limits after the City has spent over 12 million dollars building a treatment plant.

NPDES FACT SHEET
2- Snoqualmie River Total Maximum Daily Load Study: The City's wastewater plant was designed based on 203.5 lbs/day of equivalent CBOD. We do not believe it is appropriate to reduce the City's discharge limit after the facility has been built.
3- Comparison of Effluent Limits with Existing Permit Issued March 10, 2000; Page 22. We disagree with the idea that the TMDL max day calculations can be used to estimate average monthly limits. There is no basis in the TMDL study to make these estimates. The limits and calculations should be provided for the 1.75 mgd design flow of the plant since the 4th MBR train will be added before the permit expires.

TMDL Study references
The TMDL limits should be fairly applied to all dischargers. The 1994 TMDL study set the effluent ammonia concentration limit at 5 mg/l for all discharges. This was considered a reasonable limit. If this limit must be reduced, to reflect current growth projections, it should be applied equally to all discharges based on current treatment plant design flow capacity. The following is a summary of the TMDL procedures is the basis for our request:

- The intent of the TMDL Study was to apply the same treatment standards with regards to BOD and Total Ammonia to all five WWTPs discharging to the Snoqualmie River under the 5-City scenario in Table 8 (Page 31). As such, the BOD5 concentration limit is listed as 15 mg/l and the Total Ammonia concentration limit is listed as 5 mg/l for each City. Waste Load Allocations were calculated from these concentration limits using each City's **projected** dry weather maximum monthly flow (per Table 5 of the Study).

- In Table 5 of the TMDL Study, the dry weather maximum monthly flow for the "far future**"** for the City of Duvall was estimated as 1.16 cfs (0.75 mgd). In Table 8, this is the flow from which the BOD5 and Total Ammonia waste load allocations were calculated. Therefore, this establishes the intent of Ecology to provide for long term population growth in the City of Duvall service area, using the same 5 mg/l discharge limit as applied to all municipal dischargers.

- Page 34 of the TMDL Study establishes the intent to not unfairly penalize one City by requiring a higher level of WWTP performance than for another City:

  "The municipal treatment plants would have little difficulty meeting these limits during the low flow season if they perform as well as they did in 1991. Literature values also suggest that extraordinary technological measures to meet these WLAs [Table 8] would be unnecessary if the activated sludge plants were run with single stage nitrification."

  The City of Duvall WWTP upgrade included single stage nitrification in its design as required to provide concurrence with the TMDL Study.

- The TMDL Study, in providing for long term population growth in the City of Duvall at a fair technologically based treatment standard for ammonia of 5 mg/l, should be interpreted to allow the City of Duvall the following mass load limit for total ammonia:

  1.05 mgd x 5 mg/l x 8.34 = 43.8 lbs/day total ammonia WLA

  Where 1.05 mgd is the actual projected maximum month dry weather design flow (not 0.75 mgd as the TMDL Study had assumed), and with 5 mg/l as the equitable discharge concentration applied to all cities in Table 8.

- Page 38 of the TMDL Study states that: "the phased TMDL requires periodic checking and adjustment as specific NPS control measures are implemented, or as additional water quality and growth project data become available." It would be unfair, due to erroneous estimates of Duvall's population growth in the 1994 TMDL Study, to require a higher level of wastewater treatment plant performance for the City of Duvall than the other municipal discharges (including those that do not yet exist).

In summary, please review our request to keep the Duvall max day CBOD and Ammonia TMDL limits the same as in the previous NPDES permit (203.5 lbs./ day). Alternatively please revise the TMDL limits for all dischargers based on current treatment plant flow capacities.

We are very open to having a meeting to discuss these issues with you if this would help. Please call me if you have any questions.

Ecology Response:

Response to comment 1: Until such a time that the TMDL is redone and new load allocations are made based on more recent data, the Department must use the allocations as prescribed in the *Snoqualmie River Total Maximum Load Stud*y, May 1994. The TMDL clearly accounted for the possibility of future growth and the need to adjust the load allocations accordingly. At this time, it is clear that Carnation will start up during the term of the proposed permit which necessitates the use of the 5-plant allocation scheme. Permit limits from one permit cycle to the next are always subject to becoming more stringent to prevent impairments of the receiving water. The investments made by the City of Duvall to install the most update-to-date treatment technology put them in a good position to meet the potential need for future restriction on their discharge in order to protect water quality.

Response to comment 2: Refer to response 1. Ecology makes no guarantee that permit limits or water quality standards will not change over time in order to protect water quality.

Response to comment 3: In accordance with NPDES regulations at 40 CFR 122.45(d), all permit limits must be expressed, unless impracticable, as both average monthly (AML) and maximum daily (MDL) values. Both Ecology guidance (*Permit Writer's Manual*, p. VI-26) and EPA Guidance (*Technical Support Document for Water Quality-based Toxic Control*, p. 99) provide the basis for calculating an average monthly limit (AML) from waste load allocation or maximum daily limit (MDL) based on the inherent variable of the data set and the number of sample results expected per month. Refer to the fact sheet Appendix C, Table C-6, Equivalent $CBOD_5$ as calculated from DMR data and Table C-7, Calculation of AML for Equivalent $CBOD_5$.

No changes were made to the permit or fact sheet as a result of the City of Duvall's comments.

In response to the section heading "TMDL Study references," I requested input from Joe Joy, of the Department of Ecology's Environmental Assessment Program (EAP), who worked on the *Snoqualmie River Total Maximum Load Stud*y, May 1994. His response is as follows (via email 6/2/2006):

> The 'intent' of the waste load allocations (WLAs) and load allocations (LAs) in Table 8 and 9 of the 1994 report was not to place equivalent concentrations (10 mg/L BOD and 5 mg/L NH3-N) to all dischargers, but to demonstrate that it was technologically possible to meet the oxygen demand loading capacity of the Snoqualmie River under some future scenarios. The future scenarios in the tables were clearly examples as stated on page 33:
>
> "Several combinations of BOD5 and ammonia allocation are possible depending upon the expansion patterns in the valley. Two examples of WLA/LAs under greater waste loads in the future are demonstrated."
>
> The idea of flexibility in setting future permit limits is reiterated on page 34:
>
> "The two scenarios demonstrate the reason the load capacities and WLAs/LAs are expressed as approximate values. Several combinations of BOD and ammonia loading will result in D.O. compliance. The specific combinations need to be evaluated for each new plant or plant expansion, since it is the combination of these two effluent components along with the discharge location which affect downstream D.O. concentrations."
>
> This latter quote even emphasizes that it is load that counts, not concentration. This gets at Duvall's other objection, that 5 mg/L NH3-N is adequate, even at a projected dry weather design flow of 1.05 mgd.
>
> The 43.8 lbs ammonia Duvall calculates as a recommended wasteload may not be a suitable load depending on what's happening with cumulative BOD and ammonia loading from the nonpoint sources and point sources in the basin. I would especially be concerned that the new golf courses and residential growth on the ridges and up the Middle and South Forks since 1994 has increased the 'background' and nonpoint loading in the basin.